

THE ENVIRONMENTAL EVALUATION WORK GROUP FY 1979 STUDIES
OF THE

WINTER NAVIGATION DEMONSTRATION PROGRAM

EFFECTS OF SHIP-INDUCED WAVES IN AN

ICE ENVIRONMENT ON THE

ST. MARYS RIVER ECOSYSTEM

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EXECUTIVE SUMMARY

- 1. On January 25, 1978 representatives of the U.S. Fish and Wildlife Service's Division of Ecological Service (FWS-ES), the Michigan Department of Natural Resources, the Detroit District, U.S. Army Corps of Engineers (COE), and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), witnessed the ramparting of ice blocks at the shoreline and the hydraulic transport of sediments and aquatic biota onto shore ice, during the passage of an ore carrier off Frechette Point in the St. Marys River; this event generated interest in an investigation of the effects of vesselinduced, under-ice surge and drawdown waves in Great Lakes connecting channels.
- 2. In response to requests received in November-December 1978 from FWS-ES and the COE, the Great Lakes Fishery Laboratory (GLFL) agreed to undertake a COE-funded study during January-April 1979 at selected sites in the St. Marys River, to provide a base of information for evaluating the effects on fish, fish-food organisms, and fish habitat at those sites of ship-induced, under-ice surge waves, created by vessel passage in the adjacent ice-covered navigation channel.
- 3. Sampling was conducted at Frechette Point and Six Mile Point in the St. Marys River during January 16-20, February 13-19, and March 13-18, when there was solid ice cover, and during April 17-21, immediately after the solid ice cover had been broken up by heavy vessel traffic.
- 4. Macroinvertebrates of 56 taxa were identified in 75 Ponar grab samples taken during January-April at Frechette Point and Six Mile Point. The most abundant organisms were Chronomidae (midge larvae), Oligochaeta (worms), and Gastropoda (snails); collectively they comprised about 67% of the total number of organisms collected. Pelecypoda (fingernail clams), Amphipoda (scuds), Polychaeta, Ephemeroptera (mayflies), and Trichoptera (caddisflies) were common in all samples and collectively made up about 22% of the total. The density of benthic macroinvertebrates (all taxa combined) for all stations and months was 14,125.8/m².
- 5. One-way analysis of variance tests (ANOVA) revealed no significant differences ($\alpha=0.05$) in mean density of benthic macroinvertebrates among samples collected at different locations, water depths, and months, but subsequent evaluation of the power of these tests showed they would have failed to detect a significant difference in mean macroinvertebrate densities between locations 45% of the time, between depths 60% of the time, and between months 70% of the time. An unequivocal demonstration of effect (or no effect) would have required analysis of additional samples to improve the power of the ANOVAs, and probably also the collection of additional unaffected baseline data during a winter or series of winters when there was no vessel traffic in the study area.

- 6. Drift nets fished 98 times at Frechette Point and Six Mile Point during February 15-April 21, 1979, captured macroinvetebrates representing 24 taxa, aquatic macrophytes (Elodea), detritus, planktonic microcrustacea, and fish, but no fish eggs. Examination of the drift net fishing records and the records of vessel passages through the study area revealed a large increase in the amount of drift occurred as a result of vessel passage during the period of solid ice cover. Comparison of drift net catches in March when there was solid ice cover and moderate vessel traffic with catches in April when there was heavy floe ice and very heavy vessel traffic suggests the effect of vessel passage on drift was greater when solid ice cover was present.
- 7. The significance of the observed vessel-induced drift cannot be demonstrated with the available data. However, the biota and detritus represented in the drift net catches may constitute an energy resource that is important to production in the portion of the St. Marys River covered by the study. The accelerated transport of this material through the system in winter, when production approaches the annual minimum may result in a considerable energy loss to the portion of the system from which the drift material was transported.
- 8. A total of 132 light penetration measurements made at different levels in the water column suggested that vessel passage increased turbidity; they also suggested that the disturbance of the sediments by vessel passage was less when solid ice cover was replaced with heavy floe ice cover.
- 9. A total of 73 fish representing seven species was caught in gillnets, fyke nets, and traps during January-April. White suckers dominated the catch (76.7%), followed by burbot and sculpin (each at 6.8%); other species taken included yellow perch, lake herring, northern pike, longnose sucker, and ninespine stickleback. Too few fish were collected to determine if vessel passage affected fish distribution or abundance in the study area; none of the fish we collected exhibited any anatomical anomalies that we could attribute to the effects of vessel passage. The burbot was the only winter-spawning fish that we collected in the study area, and we have no evidence to indicate that burbot spawned in the study area.

TABLE OF CONTENTS

	Page No.
EXECUTIVE SUMMARY	. i
LIST OF FIGURES	
LIST OF TABLES	
LIST OF APPENDICES	•
dist of Affindices	V.
INTRODUCTION	. 1
FIGURE 1	2
FIGURE 2	3
FIGURE 3	5
RESULTS AND DISCUSSION	_
BENTHIC MACROINVERTEBRATES	6
TABLE 1	. 7
TABLE 2	9
TABLE 3	10
DRIFT	12
TABLE 4	
TABLE 5	_
TABLE 6	
TURBIDITY	• • •
FISH	
TABLE 7	
TABLE 8	, 22
LITERATURE CITED	24
ADDENDICES	25

Access	ion For
NTIS	GRA&I
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Unanno	
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	ibution/
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A-1	



LIST OF FIGURES

Figure	Pac				
1	Location of study area	ž			
2	Location of study sites	3			
3	Station locations at Frechette Point and Six Mile Point, January-April 1979	5			

LIST OF TABLES

<u>Table</u>		Page	No.
1	Benthic macroinvertebrates collected by Ponar grab from the St. Marys River at Frechette Point and Six Mile Point, January-April 1979.	. 7	
2	Density (average number/m ²) and relative abundance (as percent of total) of the major groups of benthic macroinvertebrates collected by Ponar grab from the St. Marys River, January-April 1979.	. 9	
3	Density (average number/m ²) of benthic macroinverte- brates (all taxa combined) taken by Ponar grab from the St. Marys River, January-April 1979	. 10	
4	Macroinvertebrates collected in drift nets fished at Frechette Point and Six Mile Point in the St. Marys River, February 15-April 21, 1979.	. 13	
5	Drift net fishing effort and catch at Frechette Point high impact site (station 7), February 15-16, 1979	. 14	
6	Drift net catches, March 13-April 21, 1979	. 17	
7	Percent light penetration from the middle to bottom depths at 1 m (depth) stations in the St. Marys River, February 16-April 21, 1979	. 21	
8	Total number and relative abundance (expressed as percent of total) of all species of fish collected by all gear at Frechette Point and Six Mile Point, January 16-April 21, 1979.	. 22	

LIST OF APPENDICES

Appendix		Page	No
1	Estimates of benthic macroinvertebrate density from Ponar grab samples taken at Frechette		
	Point and Six Mile Point in the St. Marys River January 16-April 20, 1979.	. 25	
2	Drift net catches at Frechette Point and Six		
	Mile Point in the St. Marys River, February 15-April 21, 1979.	. 96	
3	Record of vessel passage made through the St. Marys River for January 16-19, February 13-19,		
	March 11-18, and April 18-21, 1979	. 106	
4	Incident light (in foot-candles) measured with a submarine photometer at the surface, middle,		
	<pre>and bottom at Frechette Point and Six Mile Point, February 16-April 21, 1979</pre>	- 109	
5	Fishing effort and catch at Frechette Point		
	and Six Mile Point in the St. Marys River, January 16-April 21, 1979	. 110	
6	Comments received on draft report circulated for review on August 6, 1979, by the Great Lakes		
	Basin Commission.	. 111	

INTRODUCTION

On January 25, 1978, during an inspection tour of the St. Marys River, representatives of the U.S. Fish and Wildlife Service's Division of Ecological Service (FWS-ES), the Michigan Department of Natural Resources, the Detroit District, U.S. Army Corps of Engineers (COE), and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), witnessed the passage of the ore carrier, Philip R. Clarke, off Frechette Point. The vessel, which was traveling at a relatively high speed (11.4 mph), produced rather marked effects on the nearshore area including the ramparting of ice blocks at the shoreline and the hydraulic transport of sediments and aquatic biota onto shore ice.

In response to requests received in November-December 1978 from FWS-ES and COE, the FWS Great Lakes Fishery Laboratory (GLFL) agreed to undertake a COE-funded study during January-April 1979 at selected sites in Lake Nicolet, the St. Marys River, to provide a base of information for evaluating the effects on fish, fish-food organisms, and fish habitat at those sites, of ship-induced, under-ice surge waves, created by vessel passage in the adjacent ice-covered navigation channel. The GLFL also agreed to evaluate the information developed during the study, and other relevant materials that were available, and render judgments, where possible, regarding the effect and impact of ship-induced, under-ice surge waves on the abovementioned biota and their habitat.

As requested by COE, this study was performed under a Memorandum of Agreement between GLFL and the Great Lakes Basin Commission (GLBC), which acted as the Environmental Studies Coordinator for some of the winter navigation-related research funded by COE. According to the terms of the Memorandum of Agreement (GLBC-79-5110) some of the information needed by GLFL to select the study locations and sites and evaluate the impact of vessel passage on the biota of the St. Marys River was to be supplied by CRREL and by Lake Superior State College, who were also under contract to GLBC.

MATERIALS AND METHODS

The general study area selected by COE (Figure 1) is located in the U.S. waters of the St. Marys River in a 25.7 mile stretch of the river identified by CRREL and COE as an area most likely to experience impact from winter navigation. Two locations within the general study area were identified by CRREL as being particularly susceptible to impact by ship-induced, under-ice surge waves; these locations were Frechette Point and Six Mile Point (Figure 2). A third location, Ninemile Point, (not shown on Figure 1), was also originally identified by CRREL for study. We conducted limited sampling (for macrozoobenthos) at Ninemile Point at the beginning of the study, but because of its inaccessibility (in winter) were forced to exclude that location from further study.

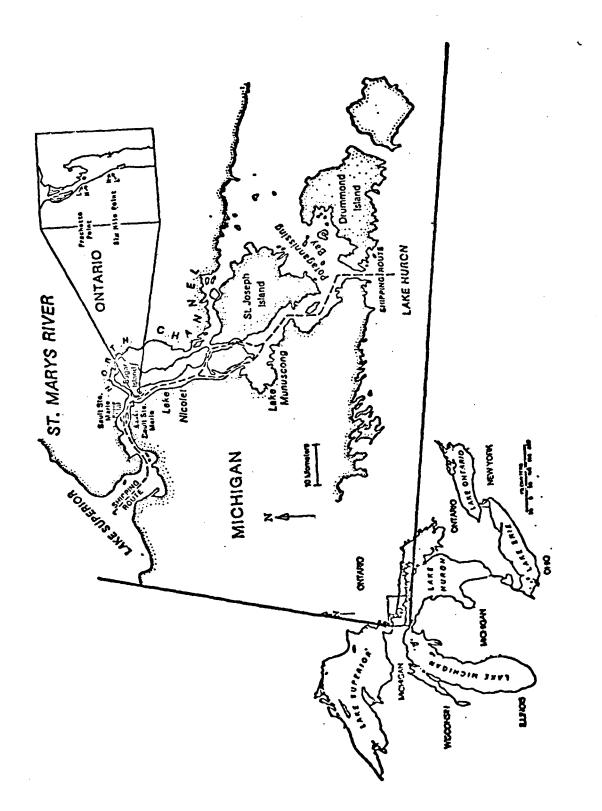
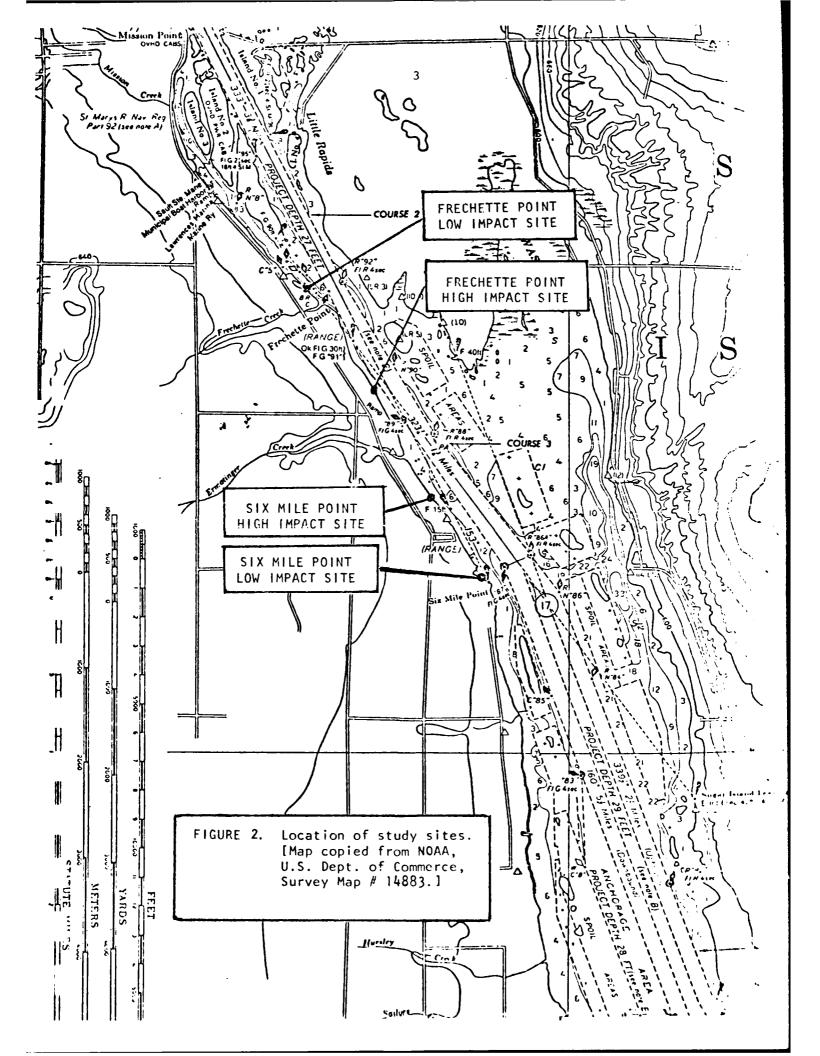


Figure 1. Location of study area.



At each of the two remaining locations we selected two sites for study. One site at a location was selected as a potentially high impact site and the other site as a potentially low impact, (reference or control) site (Figure 2). Selection of the high and low impact sites was based primarily on the relative amount of vessel-induced disturbance of the physical environment observed at the various sites by CRREL and GLFL staff. A total of five sampling stations was established at each site along the 1, 2, and 3 m depth contours (Figure 3).

Benthic macroinvertebrate samples were collected with a Ponar grab at Frechette Point and Six Mile Point. At Frechette Point, three replicate grab samples were taken at each station (1, 2, 3, 4, 6, 7, 8, and 9) at the 1 and 2 m depth contours (Figure 3). At Six Mile Point Point, three replicate grab samples were taken at each station (11-20) at the 1, 2, and 3 m depth contours (Figure 3). Samples were collected once per month, January-April, at all stations listed above, except station 19, which was not sampled in February because ice cover extended to the bottom. All grab samples were washed through a U.S. standard #30 sieve and the residue was preserved in 10% formalin. Samples were taken to GLFL where the macroinvertebrates were extracted, identified, and enumerated. As set forth in the Memorandum of Agreement, only one sample from each three-replicate set was analyzed; the remaining samples were archived and are available if needed. A total of 30 samples was also taken with a Ponar grab at Ninemile Point in January, before it was decided to eliminate that as a sampling location; all of those samples were also archived.

Drift samples were collected with standard cone-shaped plankton nets, 30 cm in diameter with 580 µm mesh. Each net was anchored in the current with a long rod; one end of the rod was driven into the river bottom and the other end extended above the ice surface. The net was fished just above the bottom and was attached to the anchor rod in a manner that allowed the net to swing freely from side to side in response to changes in direction of the current. In February, drift samples were collected at Frechette Point high impact site at four stations (7a, 7b, 7c, and 7d). These stations were located across the 1 m depth contour between stations 7 and 9; they were 57 ft apart and station 7a was 57 ft from station 7. In March and April, drift samples were taken at Frechette Point and Six Mile Point on the 1, 2, and 3 m depth contours at stations 2, 4, 5, 7, 9, 10, 12, 14, 15, 17, 19, and 20. Drift nets were fished 20, 36, and 42 times in February, March, and April respectively for a total of 808 h (average of 8.2 h per set). All material present in each drift net when it was lifted was placed in a sample jar with water and 10% formalin and taken to GLFL for processing and analysis. Each sample was processed by first extracting the macrophytes; the amount of macrophyte material was then quantified by measuring the surface area of each macrophyte fragment with a Li-cor leaf area meter LI-3000.1/, using a method developed by GLFL (C. Brown, personal communication).

^{1/}Use of trade names or manufacturers' names does not imply Government endorsement of any commercial product.

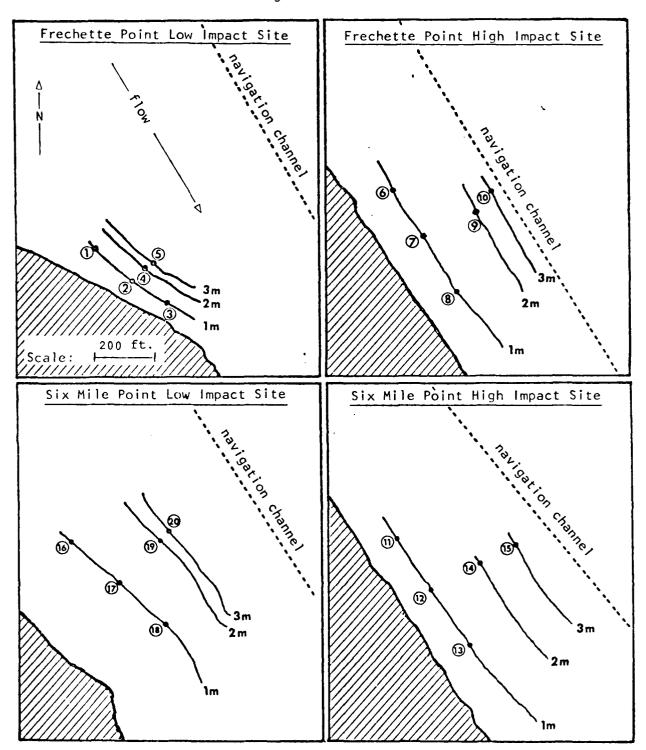


Figure 3. Station locations at Frechette Point and Six Mile Point, January - April 1979.

Macroinvertebrates were then sorted from the samples, identified, and enumerated, using a dissecting microscope. The remaining material in the sample (detritus) was put into suspension by shaking the sample jar, and then decanted onto Whatman #1 filter paper, leaving the heavier inorganic material (sand, etc.) in the jar. The detritus and the filter paper were then dried 4 h at 105°C in a drying oven, and weighed to the nearest milligram on an analytical balance.

Light levels were measured in the water column with a Photomatic Model 1 submersible photometer calibrated in foot-candles. Readings were taken at the surface, middle, and bottom of the water column at stations 2, 4, 5, 7, 9, 10, 12, 14, 15, 17, 19, and 20. A total of 18 light penetration measurements was made in February, 36 in March, and 78 in April.

Sampling for fish was conducted with graded-mesh gillnets (140 ft long and 6 ft high, with 20 ft each of 1, 1-1/2, 2, 2-1/2, 3, 4, and 5 inch mesh, stretched measure), fyke nets (16 ft long x 4 ft diameter pot; 75 ft wings; 1-1/2 inch mesh netting, stretched measure), and small hardware cloth traps (1 ft high x 2 ft wide x 3 ft long covered with 1/4 hardware cloth). Gillnets were set perpendicular to the shoreline on the 2 m depth contour at Six Mile Point (stations 14 and 19) on January 16, and left overnight; strong water currents at Frechette Point prevented us from making similar sets there, on January 16, as planned. When we lifted the gillnets at stations 14 and 19, we found them filled with macrophytes to the point that they could not have fished effectively. Because of the macrophyte clogging problem and the fact that high water velocity prevented their use at Frechette Point, we discontinued the use of gillnets and conducted all subsequent fish sampling with fyke nets and hardware cloth traps. Fyke nets were set overnight at the 2 m depth contour with the wings extending downstream; they were set at stations 9 and 14 in February and at stations 4, 9, 14, and 19 in March and April. A total of two fyke net sets was made in February, seven in March, and eight in April. Hardware cloth traps were set overnight at the 2 m depth contour at station 4; two traps were set in March and two were set again in April. Fish taken from the nets and traps were measured (total length in cm) and returned to the water alive.

RESULTS AND DISCUSSION

BENTHIC MACROINVERTEBRATES

Macroinvertebrates of 56 taxa were identified in 75 Ponar grab samples taken during January-April at Frechette Point and Six Mile Point (Table 1, Appendix 1). The taxonomic composition was quite similar at both locations with minor exceptions; eight taxa (mostly caddisflies, Trichoptera), were collected at Frechette Point but not at Six Mile Point, and five taxa were found at Six Mile Point but not at Frechette Point. The aquatic insects (Diptera, Ephemeroptera,

Table 1. Benthic macroinvertebrates collected by Ponar grab from the St. Marys River at Frechette Point and Six Mile Point, January-April 1979. [F = found only at Frechette Point; S = found only at Six Mile Point.]

Coleoptera Cnidaria Haliplus (S) Hydra Dytiscidae (S) Tricladida Lepidoptera Rhabdocoela Neuroptera Sialis (F) Nematoda Trichoptera Nemertinea (S) Mystacides Triaenodes Hirudinea Cheumatopsyche Hydropsyche (F) Oligochaeta Neureclipsis (F) Polycentropus Polychaeta Agrypnia Manayunkia speciosa Ceraclea (F) Hydroptila Copepoda Setodes (F) Molanna Decapoda Oecetis Orconectes (F) Phylocentropus Psycomyia (F) Ostracoda Hemiptera Amphipoda Corixidae (S) Gammarus Hyalella azteca Acarina Arrenurus Isopoda Asellus Gastropoda Lirceus Amnicola Campeloma Diptera **Gyraulus** Tipulidae (S) Helisoma Ceratopogonidae Lymnaea Chironomidae Physa Empididae Valvata sincera Simulidae V. tricarinata Goniobasis livescens Ephemeroptera Ephemerella Pelecypoda Baetisca (F) Pisidium Caenis Sphaerium **Ephemera**

Hexagenia

Coleoptera, Lepidoptera, Neuroptera, and Trichoptera) displayed the highest diversity with 29 taxa followed by molluscs (Gastropoda and Pelecypoda) with 11 taxa. The taxonomic composition of the macrobenthic fauna in the study area was very similar to that found in studies conducted in the St. Marys River in 1974-75 (Hiltunen 1978a) and in 1979 (Gleason et al. 1979) and also in the lower St. Clair River in 1977 (Hiltunen 1978b).

In the present study the most abundant organisms were Chronomidae (midge larvae), Oligochaeta (worms), and Gastropoda (snails); collectively they comprised about 67% of the total number of organisms collected (Table 2). Pelecypoda (fingernail clams), Amphipoda (scuds), Polychaeta, Ephemeroptera (mayflies), and Trichoptera (caddisflies) were common in all samples and collectively made up 22% of the total. The same major groups (Chironomidae, Oligochaeta, and Gastropoda) were also found to be numerically dominant in other macroinvertebrate studies on the St. Marys River (Hiltunen 1978a and Gleason 1979) and on the Lower St. Clair River (Hiltunen 1978b); there were, however, two exceptions: (1) gastropods (snails) comprised 45.1% of the total number of benthic macroinvertebrates taken by Gleason (1979) in the St. Marys River, while in the present study gastropods (snails) comprised only 19.7% of the total; and (2) Hiltunen (1978b) found that oligochates (worms) comprised 49.2-62.6% of the total catch in the lower St. Clair River, whereas in the present study they were only 22.5% of the total.

In the present study, average densities of major groups (Table 2) ranged from 129.1/m² for Trichoptera (caddisfly larvae) to 3,517.7/m² for Chironomidae (midge larvae). These densities were quite similar to densities reported for the same groups for the St. Marys River and the St. Clair River by Hiltunen (1978a, 1978b). The only major exception was that the average density of oligochaetes in the St. Clair River was higher than that found in the present study, probably because the samples on which the St. Clair River study was based were taken in spring and fall when oligochaete densities are normally higher than in winter.

In the present study, the total density of benthic macroinverte-brates (all taxa combined) for all stations and months was 14,125.8/m² (Table 2). Total density was quite variable and ranged from 1,894/m² in March at Frechette Point high impact site to 25,174/m² in February at Six Mile Point low impact site (Table 3). Densities were higher at the low impact sites in most instances. At the Frechette Point low impact site, densities were higher in all months except February and at the Six Mile Point low impact site they were higher in all months except March (Table 3).

Three, one-way analysis of variance tests (ANOVA) were run to determine if there were significant differences in mean density of benthic macroinvertebrates between locations (all months, depths, and

Table 2. Density (average number/m²) and relative abundance (as percent of total) of the major groups of benthic macroinvertebrates collected by Ponar grab from the St. Marys River, January-April 1979. [All stations and months combined.]

	Average number/m ²	Percent of total
Chironomidae	3,512.7	24.9
Oligochaeta	3,177.5	22.5
Gastropoda	2,786.0	19.7
Pelecypoda	1,485.5	10.5
Polychaeta	973.1	6.9
Amphipoda	478.8	3.4
Ephemeroptera	158.1	1.1
Trichoptera	129.1	0.9
All others	1,425.0	10.1
Total density for all taxa combined	14,125.8	

Table 3. Density (average number/m²) of benthic macroinvertebrates (all taxa combined) taken by Ponar grab from the St. Marys River, January-April 1979.

January 9,824	February	March	April
9,824	16.404		
9,824	16.404		
	20,404	2,726	1,894
13,222	8,688	21,621	6,999
17,611	9,000	20,032	17,962
21,313	25,174	18,689	18,801
	17,611	17,611 9,000	17,611 9,000 20,032

sites were pooled within each location), between the 1 and 2 m depths (all months and sites were pooled within each depth), and among months (all sites and depths pooled within months). These tests were performed on the untransformed raw count data, and because data from benthic macroinvertebrate samples often fit a negative binomial distribution, on the count data transformed (by $\log_{10} + 1$). The results of all tests were the same: no significant differences ($\alpha = 0.05$) were found. A three-way ANOVA was not run because there were too few degrees of freedom to test the interactions between factors.

The results of the above tests suggest that there was no decrease in density of benthic macroinvertebrates due to vessel-related disturbance throughout the course of the study. However, the results of the ANOVAs could also be interpreted to mean that control or reference sites were affected to the same degree as the high impact sites.

Because sample sizes in our study were small, we tested the power of the ANOVAs to detect significant differences that may have been present. Results of a "power of ANOVA" test (Dixon and Massey 1957) indicated that our sample sizes and sample variances would have failed to detect a significant difference (at $\alpha = 0.05$) in mean macroinvertebrate densities between locations 45% of the time; between depths 60% of the time; and between months 70% of the time. Using methods described by Kastenbaum et al. (1970) to determine sample size requirements for one-way ANOVA, we determined we would have needed 62 samples per location, over 200 samples per depth, and 40 samples per month to detect a significant difference (at $\alpha = 0.05$) in means 80% of the time, or to fail to detect a significant difference in means only 20% of the time. We have 150 archived samples collected during the study that could be processed to satisfy the sample size requirements to conclusively demonstrate whether or not significant differences exist between locations and among months; there is, however, an insufficient number of archived samples to permit us to conclusively demonstrate whether significant differences occur between depths.

Thus, a provisional demonstration of the effect of vessel passage on the density of benthic macroinvertebrates at the study sites will require (1) that we analyze additional samples to improve the power of the ANOVAs and (2) that the ANOVAs show a greater decrease in density at the high impact sites. An unequivocal demonstration of effect (or no effect) would also require additional "unaffected baseline" data collected during a winter or series of winters when there was no vessel traffic through the study area.

DRIFT

Drift nets were fished at Frechette Point and Six Mile Point during February 15-April 21, 1979, (Appendix 2). Macroinvertebrates representing 24 taxa were identified in the drift net catches (Table 4). All but four of these taxa (Mysis, Chaoborus, Isonychia, and Paraleptophlebia) were also found in the samples taken with a Ponar grab in the study area during January 16-April 20, 1979. The presence of these four taxa in the drift net catches, but not in the Ponar grab samples is not surprising. Mysis and Chaoborus are epibenthic forms often found in the water column; and, in the nymphal form, Isonychia and Paraleptophlebia are free-ranging (nonburrowing, nonclinging) macroinvertebrates of flowing waters that are also frequently found in the water column. The macrophyte catch in drift nets consisted entirely of green, unrooted fragments of Elodea about 0.5-15 cm long. Detritus taken in the drift nets consisted mostly of small fragments of decaying plant matter of terrestrial and aquatic origin; planktonic microcrustacea present in the catch were not identified and were included in the detritus component of catch. One small sculpin (Cottus sp.) was taken in the drift nets; no fish eggs or other fish were present in the drift net catches.

Examination of the drift net fishing records and the records of vessel passages through the study area during February-April (Appendices 2 and 3) revealed that only in February could an unequivocal demonstration be made of the effects of vessel passage on drift net catch. At all other times, vessel traffic in the study area was too frequent to permit the collection of drift net samples that could serve as an unaffected baseline against which the samples reflecting the effect of vessel passage could be compared.

Drift net fishing effort and catch in February at the Frechette Point high impact site summarized in Table 5 reveals a total of 102 net hours of fishing effort expended from 0900-1700 h on February 15 to 1030 h on February 16 yielded catches of macroinvertebrates of 0-0.24 organisms/h, no macrophytes, and small amounts (0.02-0.04 g/h) of detritus (almost entirely microcrustaceans). Catch rose sharply during 1030-1230 h on February 16 to over 10 macroinvertebrates/h, over 7 cm² of macrophyte material, and to 0.24 g/h of detritus (mostly decaying plant matter). Catch rose moderately for macroinvertebrates during 1230-1430 h to 14/h, and sharply for macrophytes and detritus to over 16 cm²/h and 5.38 g/h respectively. Catch of macroinvertebrates and detritus then declined during 1400-1600 h to about 8 cm²/h and to 0.28 g/h respectively (about the same levels recorded during 1030-1230 h), while macrophyte catch continued to rise, to over 42 cm²/h.

Table 4. Macroinvertebrates collected in drift nets fished at Frechette Point and Six Mile Point in the St. Marys River, February 15-April 21, 1979. [8=Not found in Ponar grab sample.]

Cnidaria

Hydra

Hirudinea

Oligochaeta

Amphipoda

Gammarus

. Isopoda

Lirceus

Mysidacea

Mysis relictaa

Diptera

Chaoborus^a Chrionomidae

Simulidae

Ephemeroptera

Ephemera

<u>Hexagenia</u>

Isonychiaa

Baetisca

Caenis

Paraleptophlebia^a

Trichoptera

<u>Mystacides</u>

Agrypnia

Hemiptera

Corixidae

Acarina

Gastropoda

Amnicola

Campeloma

Gyraulus

Physa

Valvata sincera

Table 5. Drift net fishing effort and catch at Frechette Point high impact site (station 7), February 15-16, 1979. [Each catch is an average value representing samples collected in four nets fished simultaneously on the 1 m depth contour.]

	Dates and hours nets fished						
Effort and catch	Feb. 15	Feb. 15-16		Feb. 16			
	0900-1700	1700-1030	1030-1230	1230-1400	1400-1600		
Effort (number of							
net-hours fished)	32	70	8	6	8		
Catch (per net-hour)							
Macroinvertebrates (number)	0	0.2	10.9	14.0	8.4		
Macrophytes (cm ²							
plant surface area)	0	0	7.33	26.67	42.23		
Detritus (g)	0.02	0.04	0.24	5.38	0.28		

Information on vessel movement through the study area obtained from the U.S. Coast Guard (Appendix 3), Alger (1979), Gleason et al. (1979), and on-site observations by GLFL staff collectively revealed the following: no vessels passed the study site on February 13-15; the U.S. Coast Guard cutter, Mackinaw, passed the Frechette Point high impact site on February 16, downbound at 1015 h, and passed again, upbound at about 1030 h, followed by the P.R. Clarke at 1250 h, the C.J. Callaway at 1304 h, and the J.C. Munson at 1328 h. Apparently the low catches in drift nets lifted at 1700 h on February 15 and at 1030 h on February 16 can be taken as the unaffected baseline condition, because no vessels passed the site during February 13 and 14 (no earlier records of vessel passage in February were examined), or on February 15. The Mackinaw passed the site downbound at 1015 h and, although its passage could have been expected to have increased the catch in the nets lifted at 1030 h, the data of Table 5 indicates it did so only minimally, if at all.

On its return trip upbound past the study site at 1030 h, however, the Mackinaw seems to have caused a large increase in catch of all of the components of drift in samples covering the period 1130-1230 h. An entirely satisfactory explanation for this difference in catch resulting from the downbound and upbound passages cannot be made with the available data. No records of vertical ice displacement (a measurement of under-ice disturbance that could have increased drift catches) were made during the Mackinaw's downbound passage. Gleason et al. (1979) provide a record for the upbound passage of the Mackinaw at 1030 h which indicates that the maximum vertical ice displacement was small (11.2 cm) relative to those caused by the three vessels that passed upbound at 1250-1328 h (60-64 cm). The results of Alger's (1979) study reveal that a vessel moving downstream at a given speed will cause considerably less vertical ice displacement and vertical sediment suspension than the same vessel passing upstream at the same speed; however, application of this generalization is confounded by the fact that the Mackinaw was backing upstream when it passed the study site at 1030 h. Nevertheless, the large increase in catch in the drift nets during 1030-1230 h on February 16 can be attributed to the disturbance (changes in current velocity and direction and the vertical displacement of ice and bottom sediments as described by Alger 1979, and Gleason et al. 1979) caused by the Mackinaw passing the study site and also to the disturbance caused upstream from the study site by the continued upbound passage of the Mackinaw. The large catches in drift nets lifted at 1400 h can be attributed to the passage of the P.R. Clarke, the C.J. Callaway, and the J.C. Munson at 1250, 1304, and 1328 h, respectively, and to the disturbance caused upstream of the study site by the continued upbound passage of those vessels and the Mackinaw. No vessels passed the study site during 1400-1600 h on February 16 and the relatively high catches during that period reflect only the disturbances caused at the site by the earlier passage of vessels during 1030-1328 h and the continuing disturbances upstream caused by their upbound passage.

The increase in catch of macrophytes during 1400-1600 h (over that during 1230-1400 h) while catches of macroinvertebrates and detritus decreased can be explained in part on the basis of the buoyancy of these three components of the drift net catch. Our observations of the macrophyte fragments in the water-filled sample jars revealed that these fragments were relatively buoyant, suggesting that those fragments dislodged from deposits in low current areas or broken from rooted stems by vessel-caused disturbance would remain in the water column long enough to be transported considerable distances downstream by under-ice river currents. The buoyancy of the macroinvertebrates and detritus in the sample jars was low compared to that of the macrophytes suggesting that the catch of macroinvertebrates and detritus during 1400-1600 h should indeed have decreased faster than that of the macrophytes. Bottom-seeking responses of benthic macroinvertebrates would also reduce their presence in the water column and their vulnerability to capture in the drift nets more quickly than would the passive sinking of the macrophytes and perhaps even the detritus.

Thus, the high drift catches shown in Table 5 during 1030-1600 h on February 16 can clearly be attributed to physical disturbances of the benthic and epibenthic habitat caused by vessels passing the study site.

Comparison of the average catches in drift nets for Frechette Point and Six Mile Point and for the high and low impact sites during March and April (only the Frechette high impact site was sampled in February) revealed differences which are difficult to interpret unequivocally, but which suggest areas which may require additional study. Moderately large differences were evident between the catches of macroinvertebrates at Frechette Point and Six Mile Point. Unweighted average catches based on pooled values from Table 6 for high and low impact sites for March and April at each location, and calculated as follows, showed the macroinvertebrate catch at Frechette Point (0.18 organisms/h) was about twice as large as that at Six Mile Point (0.09/h):

Frechette Point:
$$\frac{0.04 + 0.44 + 0.01 + 0.21}{4} = 0.18$$

Six Mile Point:
$$\frac{0.01 + 0.09 + 0 + 0.25}{4} = 0.09$$

Similar calculations revealed the macrophyte component of catch at the Frechette Point location (1.55 cm 2 /h) was about half that at Six Mile Point (3.11 cm 2 /h) and that the detritus component of catch at Frechette Point (0.23 g/h) was slightly less than twice that at Six Mile Point (0.14 g/h). Catches in drift nets at high impact sites also differed markedly from those at the low impact sites. Unweighted average catches based on pooled values from Table 6 for the two

Table 6. Drift net catches, March 13-April 21, 1979.

		Average catch per hour						
Sampling	Location	Macro- invertebrates	Macrophytes	Detritus				
period	and site	(number)	(cm ²)	(g)				
March 13-18	Frechette Poi	nt						
	High impact	0.04	5.12	0.25				
	Low impact	0.44	0.58	0.06				
	Six Mile Poin	<u>it</u>						
	High impact	0.01	3.46	0.01				
;	Low impact	0.09	1.14	0.05				
April 20-21	Frechette Poi	nt						
	High impact	0.01	0.13	0.26				
	Low impact	0.21	0.36	0.36				
•	Six Mile Poin	<u>it</u>						
	High impact	0	6.97	0.47				
	Low impact	0.25	0.88	0.04				

locations for March and April showed the macroinvertebrate catch at the high impact sites (0.02 organisms/h) was about 1/10 that at the low impact sites (0.23 organisms/h); macrophyte catch at the high impact site (3.92 cm²/h) was about 5 times that at the low impact site (0.74 2 /h); and detritus catch at the high impact site (0.25 g/h) was about twice that at the low impact site (0.13 g/h).

Because benthic macroinvertebrates transported into the water column by vessel-induced disturbance would (for the reasons mentioned earlier) tend to settle to the bottom relatively quickly where they would not be susceptible to capture in drift nets, the observed differences in catch of benthic macroinvertebrates in drift nets at the various locations and sites could be expected to be positively correlated with their densities in the bottom populations in the immediate vicinity. The higher catch of macroinvertebrates in drift nets at the low impact sites than at the high impact sites during March-April is consistent with the higher densities of macroinvertebrates in the bottom populations at the low impact sites than at the high impact sites as shown by the Ponar grab samples of Table 3 for March-April; the unweighted average densities calculated from Table 3 for March-April are 15,027/m² for the low impact sites and 10,653/m² for the high impact sites. A similar correlation was expected between drift net catch and Ponar grab samples at Frechette Point and Six Mile Point, but was not found; the densities calculated from Table 3 were 8,310/m² and 18,871/m² respectively for the two locations. The available data do not permit explanation of these inconsistent results.

The almost complete absence of information on the source populations of the two other major components of catch in the drift nets prevents interpretation beyond that given above for the February 15-16 catches; the locations of stands of macrophytes and deposits of detritus in and upstream of the study area are not known and could not be readily determined during the period of ice cover when this study was conducted.

Comparison of the drift net catches in March with those in April permit an examination of the effect on drift of vessel passage during and after the period of solid ice cover. Catches in drift nets in March differed little from those in April. The unweighted average catches of macroinvertebrates in March and April, based on pooled values from Table 6 for all locations and sites by month calculated as follows were virtually identical:

March:
$$\frac{0.04 + 0.44 + 0.01 + 0.09}{4} = 0.15$$

April:
$$\frac{0.01 + 0.21 + 0 + 0.25}{4} = 0.12$$

Unweighted average catches of macrophytes in March and April were also similar (2.57 and 2.08 cm 2 /h, respectively), and the detritus catch in March (0.20 g/h) was almost identical to that in April (0.18 g/h).

In one respect, the lack of an apparent difference between drift catches in March and April (Table 6) is not surprising. Although the solid ice cover present in March broke up (apparently in response to icebreaker activity and heavy vessel traffic, rather than ice-melt and heavy runoff) just before sampling was conducted in April, the limnological conditions that prevailed on March 13-18 and could have influenced drift catch probably differed little from those on April 20-21. Water temperature changed little during March and April, because the river had solid ice cover in March and a heavy cover of floe ice in April. River discharge (flow) was also closely similar in both months; average discharge from Lake Superior was 1903 m³/s in March and 1893 m^3/s in April (Alger 1979). Perhaps what is surprising is that the catch in March is so similar to that in April despite the heavier vessel traffic that occurred during the April sampling period (Appendix 3). A total of eight vessels passed through the study area on March 11-18, four of these during March 13-14 and 17-18, while drift nets were being fished (Appendices 2 and 3). In contrast, a total of 30 vessels passed through the study area on April 19-21; 22 of these passed on April 20-21, while drift nets were being fished.

The lack of larger catches in the drift nets in April when vessel traffic was considerably heavier suggests that the effect on drift net catch of vessel passage through the study area was greater when there was solid ice cover than when there was only floe ice cover.

The significance of the observed vessel-induced drift cannot be demonstrated with the available data. However, the biota and detritus represented in our drift net catches may constitute an energy resource that is important to production in the portion of the St. Marys River covered by our study. The accelerated transport of this material through the system in winter, when production probably reaches the annual minimum, may therefore result in a considerable net energy loss to that portion of the system from which the material is transported.

TURBIDITY

Light levels were measured at the surface, middle, and bottom of the water column to determine if vessel passage increased turbidity, as shown by a decrease in light penetration. Because light penetration varied unpredictably (apparently as a result of differences in ice thickness and condition) we calculated light penetration as follows, using the light measurements at the middle and bottom of the water column:

 $\frac{\text{ft-candles at bottom}}{\text{ft-candles at middle}} \times 100 = % \text{ of light reaching bottom from middle}$

The results indicate that light penetration at stations on the 1 m depth contour was generally lower in February than in March or April (Table 7). One exception occurred in February at station 7a at 1330-1340 when 37.5% of the light that reached the middle of the water column also reached the bottom. We also observed that light penetration in March and April was greater at the low impact sites (Table 7). The same trends observed at the stations on the 1 m depth contour also occurred at the stations on the 2 and 3 m depth contours.

Vessel passage occurred either during or just prior to all light level measurements except those taken in March (Appendices 3 and 4); therefore, we used March data as the unaffected baseline from which to measure the effects of vessel passage. With the exception of one measurement at station 7a in February, light penetration was lower in February than in March (Table 7), indicating vessel passage may have caused the decrease in light penetration observed in February. Light penetration was greater in April than in March in several instances (Table 7) in spite of heavier vessel traffic in April (Appendix 3). The breakup of solid ice cover in April may have reduced the vessel-induced disturbance of bottom sediments and permitted greater light penetration despite heavier vessel traffic.

The available data suggest that vessel passage caused decreases in light penetration (an increase in turbidity) under ice cover and that the greater decreases were caused at the high impact sites. Additional unaffected baseline data are needed for a conclusive demonstration of the effects of vessel passage on light penetration under ice cover in the study area.

FISH

A total of 73 fish representing seven species was caught by all gear during February-April (Table 8; Appendix 5). White suckers dominated the catch (76.7%), followed by burbot and sculpin (each at 6.8%); other species included yellow perch, lake herring, northern pike, longnose sucker, and ninespine stickleback. Gillnets fished twice in February caught one white sucker, and hardware cloth traps fished twice in March and twice in April caught a total of five sculpins and one ninespine stickleback. Fyke nets caught 6 white suckers (average of 3 fish/net night) in February; 11 white suckers and 1 burbot (average of 1.7 fish/ net night) in March; and 38 white suckers, 4 burbot, 2 lake herring, 2 yellow perch, 1 longnose sucker, and 1 northern pike (average of 6 fish/net night) in April. The lower fish catch in February and March indicates few fish were in the study area or that the fish in the area moved little at that time. higher catch in April may have been due to ice breakup and early spawning-related movements in the study area.

Too few fish were collected to determine if vessel passage affected fish distribution or abundance in the study area; none of the fish we collected exhibited any anatomical anomalies that we could

Table 7. Percent light penetration from the middle to bottom depths at 1 m (depth) stations [under ice cover] in the St. Marys River, February 16-April 21, 1979.

	Date and time of measurement						
Station	2/16	2/16	3/18	4/21	4/21	4/21	4/2]
	1310- 1320	1330- 1340	1445				
7a	15.7	37.5		•			
7c	14.5	21.6					
7d	17.5	20.2					
7			35.3				
	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		···—		
			1500	1100	1300	1500	1700
2			46.4	73.1	59.2	50.0	53.8
	- ,						
			1415	1600	1800		
12			25.6	14.7	20.5		
	· · · · · · · · · · · · · · · · · · ·						
			1400	1630	1830		
17			33.3	22.6	75.0		
	7a 7c 7d 7	1310- 1320 7a 15.7 7c 14.5 7d 17.5 7	Station 2/16 2/16 1310- 1330- 1340 7a 15.7 37.5 7c 14.5 21.6 7d 17.5 20.2 7	Station 2/16 2/16 3/18 1310- 1330- 1340 1445 7a 15.7 37.5 7c 14.5 21.6 7d 17.5 20.2 7 35.3 2 46.4 12 25.6	Station 2/16 2/16 3/18 4/21 1310- 1330- 1320 1340 1445 1445 15.7 37.5 7c 14.5 21.6 7d 17.5 20.2 7 35.3 35.3 7 1500 1100 46.4 73.1 1415 1600 25.6 14.7 1417 1600 1630	Station 2/16 2/16 3/18 4/21 4/21 1310- 1330- 1340 1340 1345 1345 1346 1445 7a 15.7 37.5 37.5 37.5 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3 37.3	Station 2/16 2/16 3/18 4/21 4/21 4/21 1310- 1330- 1320 1340 1445 1445

Table 8. Total number and relative abundance (expressed as percent of total) of all species of fish collected by all gear at Frechette Point and Six Mile Point, January 16-April 21, 1979.

Common name	Scientific name	Number	Percent of total
White sucker	Catostomus commersoni	56	76.8
Burbot	Lota lota	5	6.8
Sculpin	Cottus sp.	5	6.8
Yellow perch	Perca flavescens	2	2.7
Lake herring	Coregonus artedii	2	2.7
Northern pike	Esox lucius	1	1.4
Longnose sucker	Catostomus catostomus	1	1.4
Ninespine stickleback	Pungitius pungitius	_1	1.4
	Total catch	73	100.0

attribute to the effects of vessel passage. The burbot was the only winter-spawning fish that we collected in the study area, and we have no evidence that they spawned in the study area; as mentioned above, no fish eggs of any kind were collected in the drift nets.

LITERATURE CITED

- Alger, G.R. 1979. Ship-induced waves ice and physical measurements on the St. Marys River. Draft report of Project No. 5100 to the Great Lakes Basin Commission. 59 pp.
- Dixon, W.J. and F.J. Massey. 1957. Introduction to statistical analysis. McGraw-Hill Co., Inc., New York. 488 pp.
- Gleason, G.R., D.J. Behmer, and K.L. Vincent. 1979. Evaluation of benthic dislocation due to pressure waves initiated by vessel passage in the St. Marys River. Draft report of Project No. 5100 to the Great Lakes Basin Commission. 64 pp.
- Hiltunen, J.K. 1978a. Investigation of macrobenthos in the St. Marys
 River during an experiment to extend navigation through winter, 1974-75.
 U.S. Fish Wild. Serv., Great Lakes Fishery Laboratory. 105 pp.
- 1978b. Composition, distribution, and density of benthos in the lower St. Clair River, 1976-1977. U.S. Fish Wild. Serv., Great Lakes Fishery Laboratory. 177 pp.
- Kastenbaum, M.A., D.G. Hoel, and K.O. Bowman. 1970. Sample size requirements: One-way analysis of variance. Biometrika 57(2):421-430.

Appendix 1. Estimates of benthic macroinvertebrate density from Ponar grab samples taken at Frechette Point and Six Mile Point in the St. Marys River, January 16-April 20, 1979.

CATE	DEPTI (M.	1 TAYO	25GRAS COUR	TS MFAN NC./M
1/20/79	1.0	CNIMAKIA HYDRA	96	1983
		ALL CHIDARIA		1983
		MEKATUDA	13	269
		HIRUDINFA	7	145
		UL TGOCHAETA	456	9421
		POLYCHAFTA MARAYURKTA SPECIOSA	. 113	. 2335
		ALL POLYCHAETA	. •••	2335
		AMPHIPODA		2333
		HYALELLA	33	682
		ALL AMPHIPODA		662
		ISUPODA ASELLUS	. 15	

		LIRCCUS	2	
		ALL ISOPODA		351
	:	DIPTERA CERATUPOGUMIDAE	8	
		CHIRCHOF IDAE	231	4772
		EMPIDIDAE ALL DIPTERA	5	5041
		EPHEMEROPTERA		
		EPHEMERIOAC EPHEMERA	Z	
		HEX AGENTA	1	
		ALL EPHEMEROPTERA	·	62
	t	LEPIDOPTERA	. 2	41
		TRICHOPTERA	_	•
		MYSTACIDES	1	
		NEURECLIPSIS	. 2	
		POLYCE41*OPUS	4	
		ALL TRICHOPTERA		145
		ACARINA	1	21
		GASTRUPEDA AMNICOLA	102	
		GYR AULUS	14	
		FELISOMA	3	
		PHYSA	2	
		VALVATA SINCERA	4	
		VALVATA TRICARINATA	24	
		ALL GASTROPLINA		3078
		PELÍCYPPUA	10	207
		PISTOTOM		
		ALL PELECYPODA		207

MACRCHENTH	IOS OF THE ST. MARYS RIVER		STATION 02
CATE	DEPTHEM.) TAKON	GRAB COUNTS	MEAN NO./MZ
1/20/79	1.0 CHICARIA HYCRA	1	21
	ALL CHIDARIA		21
	NEMATODA	.9	186
	HIRUDINEA	1	21
	OL IGOCHAL TA	89	1839
	POLYCHAETA MANAYUHKIA SPECIOSA	11	227
	ALL POLYCHASTA		227
	USTRACONA	2	41
	AMPHIPUCA GAMMARUS	2	41
	ALL AMPHIPUDA		41
:	ISOPODA ASELLUS	3	
	LIRCOUS	1	
	ALL ISOPUDA		83
	DIPTERA CERATOPOGNIIDAE CHIRCHILIDAE EMPIDIGAL ALL CIPTERA	1 75 6	1549 1735
	EPHEMEROPTERA EPHEMERITAE EPHEMERA	1	
	ALL EPHELIFROPTERA	Ž	83
	TRICHOPTERA		
	HYDROPSYCHIDAE	1	21
	ALL TRICHOPTERA		21
	ACARINA	3	62
	GASTROPPODA ANNICOLA	23	
	GYR AUR. U.S	1	
	LANUVEV	1	
	VALVATA STREERA	63	
	VALVATA TPICARIATA	b	
	ALL GASTRIPODA		1983
	PELFCYPOON PISIOTOM	23	475
	ALL PELECYPODA	•	475

ACROBENTH	IGS OF TH	E ST. MARYS RIVER	•	STATION O
CATE	CEPTHIN	1.) TAXON	GRAB COUNTS	MEAN NO.7M
1/20/79	1.0	RHARDUCUEL A	1	21
		ULIGOCHAETA	39	806
		PULYCHAETA Manayunkia speciusa	. 2	41
		ALL POLYCHAETA		41
		AMPHIPODA HYALSLLA	2	41
		ALL AMPHIPOGA		41
	:	DIPTERA CERATUPOGUNIDAE CHIRGNOMIDAE ALL DIPTERA	2 42	868 909
		EPHEMFROPTEPA EPHEMERIDAE EPHEMERA	1	
		HEX AGEN I A	1	
		ALL EPHEMORUPTORA		41
		TRICHOPTERA PSYC+CHYIA	. 1	21
	•	ALL TRICHOPTERA		21
		ACARINA	1	21
		GASTROPUDA AMN ICULA	19	
		GYKAULUS	2	
		LYMMAFA	2	
		VALVATA SINCERA	5	
		VALVATA TRICARIDATA	19	
		ALL CASTROPOLA		971
		PELECYPODA PISTLIUM	13	269
		ALL PELECYPHEA		269

1/20/79 2.0 CHILDRY PAN B243 B243 B444 B445 B455 B45	.A1 [,	LEPHO	ME ST. MARYS RIVER M.) — TANTA	28		STATION 64
RAMERIC CLA RAMBUTCO CLA RAM	1/20/79	2.0				MEAN NO./M.
### ### ### ### ### ### ### ### ### ##					399	8243
MIMODINEA MINDOINEA MINDOINEA MINDOINEA MINDOINEA ALL DECEMBER MANAMURATA SPECIOSA MANAMURATA SPECIOSA MANAMURATA ALL DECEMBER MANAMURATA ALL DECEMBER MANAMURATA AND SPECIOSA ALL APPRINCIPA ALL APPRINCIPA ALL ISPONIA ASTLUS LIPCOUS LIPCOUS LIPCOUS LIPCOUS LIPCOUS LIPCOUS ALL ISPONIA ALL ISPONIA ALL ISPONIA ALL ISPONIA BIFFER SPECIA CHARLES SIMULTIDAE ALL COMPANIA ALL EN ENCROPERA ALL COMPANIA CEPACION ALL EN ENCROPERA ALL COMPANIA COMPANIA COMPANIA ALL EN ENCROPERA ALL COMPANIA ALL COMPAN						8243
HINDELINEA					1	21
DUTCHATA DUTCHATA POUTCHATA POUTCHATA POUTCHATA ALL APPHPOUTCH ALL APPHPOUTCH ALL APPHPOUTCH ALL ISPOUTCH ASELLIS LIPCEUS LIPCEUS LIPCEUS LIPCEUS LIPCEUS LIPCEUS LIPCEUS ALL LIPCEUS LIPCEUS ALL LIPCEUS LIPCEUS ALL LIPCEUS ALL LIPCEUS ALL LIPCEUS ALL LIPCEUS ALL LIPCEUS BERNAREN DATE CHIRARINE A					4	83
POLYCHAETA MANTHURIA SPECIOSA MANTHURIA SPECIOSA ALL PLYCHAETA OSTRACICA ANDELICA ANDELICA ANDELICA ANDELICA ALL APPRIFOCA ALL APPRIFOCA ALL ASPRILIS ASSELLIS ASSELLIS ASSELLIS ASSELLIS ALL ISTROCIA CERATOPOGNIUSE CERATOPOGNIUSE CHRIRINFIDAE CHRIRINFIDAE CHRIRINFIDAE CHRIRINFIDAE CHRIRINFIDAE CHRIRINFIDAE CHRIRINFIDAE EPHEREROPIERA ALL LIPTERA ALL EPHEREROPIERA ALL TETLIPIERA ACREMICA CHEUNATIONSCHE HURCHOPUS ALL INTERPAS		·			1	21
MANAYURA SPECIOSA ALL PLITERATIA ALL PRITERATIA OSPRACECA APPLIPOCA WYALULIA ALL APPLIPOCA WYALULIA ISOPODA ASSELUS ISOPODA ASSELUS ISOPODA ASSELUS ISOPODA ALL ISOPODA ALL ISOPODA ALL ISOPODA ALL ISOPODA ALL ISOPODA ALL ISOPODA CERTIFOCOS, TIDAE ALL INTERA ALL INTERA ALL INTERA ALL INTERA ALL EPPERRA ACREMANA ACREM					111	2293
ALL PETYCHAETA 2 41 OSTRACCA 2 41 AMPHIPODA 15 310 ALL APPHIPODA 310 ISURDON ALL ASPHIPODA 2 LIPCRUS 10 LIPCRUS 10 ALL ISTRUCA 2 CHRIMINITORE 2 CHRIMINITORE 170 EMPLETOR 8 3512 EMPLETOR 8 4 3801 EMPLETOR 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			MANAYUNKTA SPECIOSA		.	41
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ANUTATION 15 310 ALL APPPLICA 310 ALL APPPLICA 310 ALL APPLEOUS 2 LIPCOUS 10 ALL ISPOCA 248 DIPTERA 248 CERATCHOGOTIDAE 170 3512 EMPLEIOAC 8 6 STALL TIPTERA 4 3801 EMPLEOUS 10 ALL CHPIERA 4 3801 EMPLEOUS 8 10 ALL CHPIERA 5 10 EMPLEOUS 8 10 ALL EMPLEAD TOPA 8 83 ALL EMPLEAD TOPA 9 10 ALL EMPLEAD TOPA 9 11 ALL EMPLEOUS TOPA 9 11 ALL EMPLEAD TOPA 9 11 ALL EMPLEOUS			DSTRACTCA		2	
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150PGEA ASTLUS 2			****		15	310
ASSELUS LIPCEUS LIPCEUS ALL ISTOPUCA OIDETERA CERAIEPROCRIDAS CHRIMIPAIDAS CHRIMIPAIDAS SIPULITUAC EPPICIDAC EPPICIDAC EPPICIDAC EPPICIPAC EPPERROPIERA ALL CIPTERA EPPERROPIERA ALL EPPERROPIERA ALL EPPERROPIERA ALL EPPERROPIERA AGREPATA AGREPATA AGREPATA CERALLA LIPCEURATOPS HYDROPSYCHE HYDROPSYCHE HYDROPSYCHE AVSTACIDES ALL INTERCLIPAS ALL INTERCLI						310
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ALL ISPPODA ALL ISPPODA DIPTERA CERAICPUGICATIDAE CHIRRIMICHIDAE CHIRRIMICHIDAE ALL EIPTERA ALL EIPTERA EPHERREROPIE/A EPHERREROPIE/A EPHERREROPIE/A ALL EPHERREROPIE/A ACREMIA CEPACLIA CEPACLIA CEPACLIA AND CELOHATIOS/CHE AND CELOHATIOS/C			LIPCEUS		10	
DIPTERA CERTICUPOCIONIDAE CHIROMENTIDAE CHIROMENTIDAE CHIROMENTIDAE CHIROMENTIDAE CHIROMENTODAE						248
CHARMICKIDAE EPPICIONC SIPULITAE ALL CIPTERA EPPECROPICE EPPECROPICE EPPECROPICE EPPECROPICE EPPECROPICE EPPECROPICA (PPECROPICA EPPECROPICA ALL EPPEROPICA ACREPPIA IRICHIPILEA CEFACLEA CHEUNATIOPSCHE MYSTACHOS POLYCENIBROUS ALL IFFICULTA ACASTRUMEA ANTICCLA CONTERATA CONTERATA CONTERATA CONTERATA CONTERATA ANTICCLA ANTICCLA EPPECROPICA ANTICCLA CONTERATA CONTERATA CONTERATA ANTICCLA ANTICCLA ANTICCLA ANTICCLA ANTICCLA ANTICCLA CONTERATA CONTERATA ANTICCLA ANTICCLA ANTICCLA ANTICCLA ANTICCLA CONTERATA CONTERATA ANTICCLA ANTICCLA ANTICCLA ANTICCLA ANTICCLA ANTICCLA ANTICCLA ANTICCLA ALL CONTERATA ANTICCLA ALL CANTERPOLORIA PLECEPPELS PISTILIE ANTICCLA ALL CANTERPOLORIA						
STPULTIBLE			CHIRDNEMIDAE			3512
### ### ##############################			SIMULTIDAE			
### ### ##############################						3801
ALL EPPERCOPTERA ALL EPPERCOPTERA 1 RICHOPTERA AGRYPSIA 1 CFFACLEA 1 CFFACL					1	
ALL EPPENEROPTERA 1			HEX AGENTA		•	
AGRYPMIA CEFACLEA 1 CHEUMATOPSYCHE 2 HYDERDSYCHE 1 MYSTACTORS 1 MEDICCLIPSIS 2 POLYGENTAPPOS 3 ALL TRICHOPTERA 227 ACARINA ACARINA ACARINA AMPTOLA CHRICHASIS LIVENGENS 1 GYMANGUS ACLUSIONA APPTOLA CHRICHASIS LIVENGENS 1 CYMANGUS ACLUSIONA APPTOLA LYPHATA 11 VALVATA INTICAPA ALL GASTROPHEA PELECYPETA ALL GASTROPHEA 2168 PELECYPETA PISTITUE 44 209				•		83
CFFACLEA						
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HYDROPSYCHE HYSTACIDES HYSTACIDES REDRICUISIS POLYGENIACPUS ALL IFICHCPIERA CASTROPLOA AMPICELA CONTERASIS LIVESGENS 1 CYNAMICS FULICANA PUTSA IN VALVATA SINCIPA ALL GASTROPLIA ALL GASTROPLIA PETECOPELA PETECOPELA PETECOPELA PETECOPELA PISTILIE PASSINCE ALL GASTROPLIA ALL GASTROPLIA ALL GASTROPLIA PETECOPELA PISTILIE ALL GASTROPLIA PISTILIE PIST						
MYSTACIDES			********	• •		
NEURECUIPSIS 2						
POLYCEPTREPUS ALL TETCHOPTERA ACARINA CASTROPLOA AMPTOCIA CONTREPASIS LIVESCENS 1 CORRESPOND FULICUNA FULICUNA PUYEAL VALVATA SHICLPA VALVATA TETCAPLIATA ALL GASTROPOLA PLECYPUTA ALL GASTROPOLA 2768 PELECYPUTA PISHTIM PISHTIM ALL GASTROPOLA PISHTIM PISHTIM ALL GASTROPOLA PISHTIM PISHTIM ALL GASTROPOLA POP						
ALL TRICHEPTORA ACARTAA CASTROPHOA AMPTICOLA SA CONTRIBASIN LIVENCENS 1 GYRADLUS 6 FÉLICENA ALLYPHALA 11 VALVATA SINCEPA ALL GASTROPHIA ALL GASTROPHIA PLISTETIA PLECYPELA PLISTETIA PLISTETIA ALL GASTROPHIA PLISTETIA PLISTETIA ALL GASTROPHIA PLISTETIA PLISTETIA ALL GASTROPHIA PLISTETIA PLISTETIA						
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AMPTICALA CONTREASTS LIVESCENS 1 GYRADRUS 6 HELICINA 1 LYMMALA 1 PRYSA 11 VALVATA SINCLEA ALL GASTEGERIA PELICAPITA PISTITUE 44 709					3	62
CONTRACTS LIVESCENS			Vanitour a		54	
GYRAULUS			CONTREASTS LIVESCENS		1	
PELICONA			GYRAHLUS		6	
LYPMALA 1 PHYSA 11 VALVATA SINCEPA 47 VALVATA 1PICAPLIATA 6 ALL GASTROPOLA 2768 PELFCYPCIA 2768			HEL ISONA		8	
PPYSA 11 VALVATA SINCEPA 47 VALVATA 1PICAPLIATA 6 ALL GASTEGERIA 2768 PELFCYPCIA 44 709			LYMNALA		1	
VALVATA SINCEPA			PHYSA		11 .	
VALVATA 1910AP1.1ATA 6 ALL GASTROPOLA 2768 PELFCYPCIA 44 709			VALVATA SINCEPA		41	
ALL GASTRIAPOLA 2768 PELFCYPELA 44 709			VALVATA TRICAPIJATA		6	
P151(10 % 44 209						2768
******					44.	000
01.1 P77.1.1 TP111.0					44	909

PACREBENTI	CS OF THE ST. MARYS RIVER		STATION 06
CATE	DEPTH(M.) TAXON	GRAB COUNTS	MEAN NO.772
1/20/79	1.0 NEMATOCA	. 7	145
	HIRUDINEA	2 .	41
	OL IGOCHAETA	59	1219
	POLYCHAETA		
	MANAYUNK LA SPECTOSA	16	331
	ALL POLYCHAETA	•	331
	OSTRACODA	2	41
	AMPHIPODA	,	
	GAMMARUS	4	
	HYALELLA	2	
	ALL AMPHIPODA		124
	ISOPODA		
	LIRCEUS	1	21
	ALL ISUPCEA		21
	CIPTERA		
	CERATOPOGONIDAE	2 145	2996
	CHIRONOMIDAE EMPIDIDAE	2	2770
	ALL DIPTERA	· -	3078
	EPHEMFROPTERA	•	
	EPHEMERIDAE HEXAGENTA	4	
	THE ACTIVITY	•	
	ALL EPHEMSROPTERA		83
	TRICHOPTEPA	•	
	HYDROPSYCHIDAE	1	
	MYSTACIDES	1	
	PULYCENTACPUS	1	
	ALL TRICHOPIERA		62
	ACARINA	2	41
	GASTROPCIDA		
	AMN I CCL A	16	
	GYRAULUS	15	
	FALMVEY	1	
	VALVATA SINCERA	25	
	VALVATA TE CARTAATA	42	
	ALL GASTROPOLA		2045
•	PELECYPCIDA		
•	PISICIUM	11.	
	SPHACPTON	1 .	
	ALL PELECYPODA		248
	HEE LEECHTON		- '*

CRCBENT	HOS OF THE ST. MARYS RIVER		STATION O
CATE	10x4T (.4) 4T430	GRAB COUNTS	HEAU NO./"
/20/79	1.0 CHIDARIA HYURA	.9	186
	ALL CNIDARIA	•	186
	NEMATODA	14	289
	HIKUDINEA	1	21
	DETGUCHAETA	. 51	1054
	POLYCHAETA MANAYUIKTA SPECIOSA	16	331
	ALL PULYCHAETA		331
	AMPHIPCON Gammarus	2	
	HYALFILA	12	
	ALL AMPHIPODA		289
	ISUPUGA ASELLUS	1	21
	ALL ISOPODA		21
	DIPTERA CERATOPOCONIDAE CHIROROEIDAE ALL DIPTERA	2 230	4752 4793
.*	EPHEMIROPTERA FPHEMERIDAE HEXACENIA	2	
	ALL EPHINIROPTERA		83
	TRICHOPTEPA HYDROPTILIDAC	2	
	MYSTACIDES	2	
	ALL TRICHUPTERA		83
	ACAR INA	6	124
	GASTROPODA AMELICE E A	46	
	GYRAULUS	24	
	PHYSA	4	
	VALVATA SINCEPA	46	
	VALVATA TRICARLIATA	145	
	ALL GASTRUPODA		5475
	PELECYPPUA PISTOTUM	28	578
	ALL PELLCYPORA		578

*Crop(N1)	HOS OF THE ST. MARYS RIVER		STATION D
DATE	DEPTH(M.) TAXON	GRAP COUNTS	MEAN NO./MZ
1/20/79	1.0 CHIPARIA HYDRA	6	124
	ALL CHIDARIA		124
	NEMATODA	. 8	165
	DLIGOCHAETA	1	1591
	POLYCHAETA MANAYUNKIA SPECIOSA	. 47	971
	ALL POLYCHAETA		971
!	AMPHIPODA	•	
•	GAMMARUS	1	
	HYALELLA AZTECA	1	
	ALL AMPHIPODA		41
	DIPTERA CERATOPOGUMIDAE CHIRONOMIDAE ALL DIPTERA	1 95	1963 1983
i.	EPHEMEROPTERA EPHEMERIDAE EPHEMERA		
•	ALL EPHEMEROPTERA	•	62
	TRICHOPTERA NEURECLIPSIS	1	21
	ALL TRICHOPTERA		21
	NEUROPTERA SIAL IS	1,	21
	ALL NEUROPTERA		21
	ACAR INA	4	63
	GASTROPOUA AMNICOLA	35	2
	GYRAULUS	3	
	VALVATA SINCERA	11	
	VALVATA TRICARLIATA	17	
	ALL GASTROPPOA		1364
	PELECYPOI'A EUI 31 21 9	13	269
	ALL PELECYPODA		269

CATE D	EPTH(M.) TAXON	GRAB COUNTS	MEAN NO./HZ
/20/79	2.0 CHIPARIA		
	HYCRA	33	682
	ALL CNIDARIA		682
	NEMATODA	4	83
	HIRUCINEA	10	207
	OL IGOCH ALTA	89	1839
	POLYCHAETA MANAYUNKIA SPECIOSA	. 1	21
	ALL POLYCHAETA		21
	AMPHIPODA GAMMARUS	1	
	HYALELLA AZZECA	1	
;	*******	1	
	ALL AMPHIPGDA		41
	ISOPODA ASELLUS	2	41
	ALL ISOPODA		41
	DIPTERA CERATOPOGONIDAE CHIRONOMIDAE ALL DIPTERA	5 219	4525 4628
i,	EPHEMEROPTERA EPHEMERIDAE EPHEMERA	1	
	HEXAGENIA	6	
	ALL EPHEMEPOPTERA		145
	LEPIDOPTEPA	2	41
	TRICHCPTERA HYCRGPTILIDAE	1	21
	ALL TRICHOPTERA		21
	ACAR 1HA	1	21
	GASTROPODA AMNICOLA	47	
	GYRAULUS	22	
	HEL I SOBA	21	
		1	
	PHYSA	57	
	VALVATA STREERA		
	VALVATA TRICAPITATA	98	4938
	ALL GASTROPOEA		7770
	PELFCYPNON PISTCHUM	34	707
	ALL PELICYPONA		702

CATE	DEPTH(M.) TAXEN	GRAB COUNTS	MEAN NO./M
/16/79	1.0 CNIDARIA Hydra	1	21
	ALL CHIDARIA		21
	RHABDOGOELA	3	62
	NEMATUDA	110	. 2273
	OL IGOCHAETA	326	6735
	POLYCHAFTA Manayunkia speciosa	101	2087
	ALL POLYCHAETA		2087
	AMPHIPCOA Gamharus	3	
	HYALELLA AZTECA	13	
	ALL AMPHIPUDA		331
	1SUPONA	•	
•	ASFLLUS	1	
	LIRCEUS	3	
	ALL ISOPODA		83
	DIPTERA CERATUPUGONIDAE	12	•
	CHIRONOM IDAE	52	1074
	EMPIDICAE ALL GIPTERA	1	1343
	EPHEMEROPTERA		
•	EPHEMLROPTERA CAEHIS	1	
	EPHEHERIDAE		
	EPHEMERA	6	
	HEXAGENIA	10	
	ALL EPPEMEROPTERA		351
	TRICHOPTERA Mystacides	1	
	POLYCENTROPUS	1	
	ALL TRICHOPTERA		41
	ACARINA	7	145
	GASTROPODA	22	
	AMH ICOL A	33	
	GYRAULUS	4	
	HEL ISONA	3	
	LYMNAFA	2	•
	VALVATA SINCERA	37	
	VALVATA TRICAPINATA	19	
	ALL GASTROPODA	•	2025
	PELFCYPOLA PESTOTUM	47	868
	PISTOTUS ALL PELECYPUSA		868

DATE	DEPTH(M	C ST. MARYS RIVER	34GRAB COUNTS	STATION 1
/16/79	1.0	CNIDARIA		
		HYDRA	2	41
		ALL CNIDARIA	_	41
		RHABDOCOELA	2	41
		NEMATODA	182	3760
		HIRUCINEA	4	83
		OL IGOCHAETA		7056
		POLYCHAETA MANAYUNKTA SPECIOSA	444	9173
		ALL POLYCHAETA		9173
		OSTRACODA	3	62
		AMPH1POPA	•	
		GAMMARUS	2	
		HYALELLA	. 10	
		ALL AMPHIPODA		248
,		ISUPODA ASELLUS	8	165
`		ALL ISTIPUCA	·	165
		DIPTERA		105
		CERATOPUGUNIDAE	5	1042
		CHIRONCHICAE ALL DIPTERA	95	1963 2066
		EPHEMEROPTERA		
		EPHEMEROPTERA CAEMIS	1	
		EPHEMERIDAS	•	
		EPHEMERA	4	•
		HEXAGENTA	9	
		ALL EPHEMEROPTERA		289
		COLEOPTERA HAL'PLIDAE	1	21
		ALL COLEOPTERA	•	21
		TRICHUPTERA		
		HYDROPTIL IDAE	. 1	
		MYSTACICES	8	
		DECETTS	1	
		POLYCENTRUPUS	2	
		ALL TRICHOPTIRA		248
		ACARINA	6	124
		GASTROPODA AMRICOLA	67	
		GYRAULUS	7	
			_	
		HELISCHA	. 2	
		PHY 54	. 3	
		VALVATA STREEPA	62	
		VALVATA TELCAPINATA	79	
		ALL GASTROPODA		4545
		PELFCYPCEA PISTURUM	57	1176
		ALL PELECYPODA	••	1176

	F THE ST. MARYS RIVER		STATION 13
DATE DEP	TH(M.) TAXUU	GRAB COUNTS	MEAN NO./M
/16/79 1	O CNIDATA HYDRA	2	41
	ALL CNIDARIA		41
	RHABDOCOELA		83
	NEMATORA	32	661
	HIRUDINEA	Z	41
	DLIGUCHAETA	. 107	2231
	POLYCHAETA Manayulkia speciosa	132	2727
	ALL PULYCHAETA		2727
	AMPHIPUDA		
,	GAPPARUS	1	
į	HYAL FLL A	4	
	ALL AMPHIPOCA		103
	DIPTERA CERATOPOGUNIDAF CHIRONONIDAE	2 135	2789
	EMPICIDAE All Diptera	2	2872
	EPHEMERCIPTERA .	•	
	EPHENER I DAG EPHENERA	2	
ی	HEX AGEN IA	1	
	ALL EPHLMEROPTERA		62
	TRICHOPTERA		
	MOLANNA	1	
	MYSTACIDES	5	
	DECETIS	4	
	ALL TRICHMPTERA .		207
	ACARINA	4	83
	GASTROPODA AMNICOLA	28	
	GYRAULUS	6	
	HEL I SCIMA	2	
	PHYSA	1	
	VALVATA SINCERA	· 2	
	VALVATA TRICARINATA	48	1797
	ALL GASTRUPGNA	•	1171
	PELECYPODA P15101UP	. 23	475
	ALL PELLCYPODA		475

PACREBENTHO DATE	OS OF TH	L ST. MARYS RIVER	36CRAG CEURTS	STATION 14
1/17/79	2.0	CNEDARIA HYURA	16	331
		ALL CNIDARIA		331
		RHABDUCCIELA	4	83
		TRICLACIDA	1	21
		NEMATGCA	• 17	351
		HERULINEA	2	41
		OL 1GCCHAETA	302	6239
		POLYCHAETA MANAYUNKIA SPECIOSA	6	124
		ALL POLYCHAFTA	•	124
		DSTRACODA	20	413
		AMPHIPUDA GAMMARUS	b	
		HYALELLA AZIECA	53	
		ALL AMPHIPODA		1219
		ISOPUCA	_	
		ASELLUS LIRCEUS	8	
		ALL ISOPUÇA	3	227
		DIPTERA		227
		CERATOPOSONIDAE CHIPUNCKICAE	. 11	20/2
		EMPICICAL ALL DIPTERA	187	3863
		EPHEMEROPTERA	•	4132
		HEXAGENIA	14	
		ALL EPHEMEROPTERA		289
		COLEOPTERA	1	21
		TRICHOPTERA	1	
		AGRYPHIA	• 1	
		MYSTACIDES	•	41
		ALL TRICHOPTERA ACARINA	9	186
		GASTEUPOUA	·	
		AMVICOL A	75	
		GONTOBASTS LIVESCENS	1	
		GYRAULUS	43	
		HEL ESOMA	1	
		PHYSA	5	
		VALVATA SINCERA	105	
		VALVATA IPICARIVATA	17	
		ALL GASTROPOUA	•	5103
		PELECYPODA PISIDIOM	173	3574
		ALL PELECYPODA		3574

DATE	CEPTH(M.) TAXON	GRAB COUNTS	MEAN NEL 44
		GRAB CCUNIS	MEAN NO./M
/17/79	3.0 CNIDARIA Hydra	35	723
	ALL CHIDARIA	·	723
	RHAUDOCOEL A	3	62
	NEMATODA	30	6 20
	OLIGOCPAETA	. 1	5227
	POLYCHAETA	·	
	MANAYUNKIA SPECIOSA	15	310
	ALL PCLYCHAETA		310
	OSTRACCUA	2	41
	AMPHIPCDA		
	GAMMARUS	1	
	PYALELLA	1	
	ALL AMPHIPADA		41
	DIPTERA CERATOPOGUNIDAS	15	
	CHIRONOMICAE	162	3347
	EMPICIDAE ALL DIPTEPA	. 1	3677
	EPHEMERTPTERA	•	
	EPHEMERIDAE Ephemera	3	
	HEX AGEN I A	32	
	ALL EPHEMEROPTERA		723
	LEPIDIPIER4	1	21
	TRICHOPTERA	•	
	OFCETIS	1	21
	ALL TRICHOPTERA		21
	ACARINA	8	165
	GASTKCPCUA	••	
	ANTICOLA	32	
304	GYRAULUS	3	
	HELISCHA	5	
	VALVATA SINCERA	53	
	VALVATA TRICAPILATA	4	
	ALL GASTROPODA		2904
	PELECYPODA	N on	2731
	P1510108	108	2231

PACROBENTHUS	OF THE S	T. MARYS RIVER			STATION 16
DATE DE	PTP(M.)	LAXON	38	GRAH COUNTS	MEAN NO.7M2
1/16/79		MIRARIA		3	62
		HYERA ALL CNIDARIA		,	62
				5	103
	•	HABDUÇDELA		8	165
		RICLACIDA		43	
		EMATODA		2	888 41
		IRUDINEA		414	
		ELIGOCHAETA GLYCHAETA		717	6553
	,	MANAYUNKIA SPECIOSA		35	723
		ALL POLYCHAETA			723
	0	STRACUCA	•	4	83
	A	MPHIPODA HYALELLA AZTECA		110	2273
		ALL AMPHIPODA		•••	2273
		SOPODA			22.7
	•	ASELLUS		25	
;		LIRCEUS		10	
		ALL ISOPODA			723
		OIPTERA CERATOPUSONIDAE		30	
		CHIRONOMIDAE EMPICIDAE		591 3	12210
		ALL DIPTERA		•	12892
	E	CPHCHCROPTERA			-
		CAENIS	•	2	
•		EPHEMERICAE		1	
		EPHLMERA		4	
		HEXAGENIA ALL EPHEMEROPTERA			145
		COLEUPTERA			
	•	CALISCIDAT		1	21
		ALL COLEOPTERA			21
	(LEPICOPTERA		18	372
		TRICHOPTERA MYSTACIDES		16	
		PHYLOCERTROPUS		1	
		POLYCENTROPUS		11	
		ALL TRICHOPTERA			576
		ACAPINA	•	6	124
		GASTROPCLA			
		AMNICOLA		46	
		GYPAULUS		31	
		LYPHALA		, 1	
		PHYSA		2	
		VALVATA SINCTPA		33	
		TAPTRADIBLE CANDAL		5	
		ALL GASTK POHA	-		2434
		METECALITY		175	3615
		P1511 11.1		111	4015
		ALL FOLICATION			•••

DATE D	CEPTHIP.) TAXON	GRAB COURTS	MEAR 1
/16/79	1.0 CNICARIA	CRAB CUU!(1) 5	# FEAT
	HY CR A	2	41
	ALL CHIDARIA		41
	RHAUDOCOELA	2	41
	NEMATOCA	11	227
	HIRUCINEA	1	21
	DL IGOCHAETA	204	4215
	POLYCHAETA Manayuik ia Speciosa	3	62
	ALL POLYCHAETA		62
	AMPHIPOCA		
	UAFFARUS	•	
	HYALELLA	95	
	ALL AMPHIPUCA		2066
	ISOPODA ASELLUS	3	
	LIRCEUS	1	
•	ALL ISUPODA	•	83
	DIPTERA	•	63
	CERATOPOGONIDAE	48	
	CHIRUNOMIDAE Empididae	520 6	10743
	TIPULIDAE ALL DIPTERA	. 1	11879
	EPHEMEROPTERA CAUNIS	3	
.	EPHEMER I DAE CPHEMERA	12	
	HEX AGEN I	1	
	ALL EPHEMEROPTERA	•	331
	COLEGPTERA GYTISCIDAE	1	21
		•	21
	ALL COLEOPTERA	3	6:
	LEPIDOPTERA	,	3,
	TRICHOPTERA Mystacides	2	
	POLYCENTRUPUS	1	
	ALL TRICHOPTERA		6
	ACARINA	18	3/2
	GASTROPODA		
	AMH I COL A	46	
	GYRAULUS	79	
	PHYSA	3	
	VALVATA STUCERA	. 2	
	VALVATA TETCARTIATA	4	
	ALL GASTRUPHUA		2768
	PELECYPODA	_	
	P151C10*	393	411

	OS OF THE ST. MARYS RIVER		STATION 1
CATE	DEPTH(M.) 14XON '	GRAB COUNTS	MEAN NO./K
1/17/79	1.0 CNIDARIA HYDRA	1	21
	ALL CNIDARIA	•	21
	RHABDOCNELA	5	103
	NEMATOCA	. 58	1198
	HIRUCINEA	5	103
	OL IGUCHAFTA	224	4628
	POLYCHASTA Manayunkia Speciosa	. 65	1343
	ALL POLYCHAETA		1343
	AMPHIPODA HYALELLA AZTECA	99	2045
	ALL AMPHIPUDA		2045
	ISCPODA		
÷	ASELLUS	1	
	LIRCFUS	1	
	ALL ISOPUUA		41
	DIPTERA CERATOPUGGNIDAE CHIRGGEMIDAE	12 127	2624
	EMPIDIDAE ALL DIPTERA	2	2913
	EPHEMEROPTERA		
,	EPHEMERIDAE EPHEMERA	. 3	
•	HEXAGENIA	9	
	ALL SPHEMEROPTERA		248
	COLEUPTERA		
	HAL IPLUS	1	21
	ALL COLEMPTERA		21
	TRICHOPTERA Mystaclues	13	
	PHYLOCENTROPUS	1	
	ALL TRICHOPTERA		289
	ACARINA	6	165
	GASTRUPGEA		
	AMNICOLA	38	
	GYPAUL US	2	
	HELISCMA	1	
	VALVATA SINCERA	20	
	VALVATA TRICARIMATA	3	
	ALL GASTROPOUA		1322
	PELECYPODA PISTOTUM	188	3684

ALL PELECYPODA

ACKUBENTI	OS OF THE ST. MARYS RIVER		STATION 19
CATE	DEPTH(H.) TAXON	GRAB CCUNTS	MEAN NO./M
/17/79	2.0 NEMATODA	9	186
	OLIGOCHAETA	55	1136
	POLYCHAETA Manayunkia speciosa	, 3	62
	ALL POLYCHAETA		62
•	AMPHIPODA Hyalella azteca	21	434
	ALL AMPHIPODA		434
1	1SOPODA ASELLUS	5	
	LIRCEUS	2	
	ALL ISOPOCA		145
	DIPTERA CERATOPOGONIDAE CHIRUNGMIDAE EMPIDIDAE ALL CIPTERA	15 79 3	1632 2004
,	EPHEMEROPTERA EPHEMER I DAE EPHEMERA	3	
	HEXAGENIA	6	
	ALL EPHEMEROPTERA		186
	TRICHOPTERA MYSTACIOES	4	83
	ALL TRICHGPTERA		83
	GASTREPODA AMNICULA	. 26	
	GYRAULUS	?	
	VALVATA SINCERA	1	
	VALVATA TPICARIHATA	3	
	ALL GASTROPUGA		661
	PELECYPODA PISTOTUM	53	1095
	ALL PELECYPODA		1095

	HOS OF THE ST. MAPYS RIVER		
DATE	DEPTH(M.) TAXON	GRAB COUNTS	MEAN NO.7M2
1/17/79	3.0 CHICARIA HYDRA	4	. 83
	ALL CNIDARIA	•	83
	RHARDOCGEL 4	1	21
	TRICLACIDA	12	248
	NEMATODA .	19	393
	OL IGOCHAETA	238	4917
	АНРИТРИТА		
	GAMMARUS	1	
•	HYALELLA	6	
	ALL APPHIPUUA		145
	ISOPODA ASELLUS	43	-
	LIRCEUS	31	
	ALL ISOPEON	•	1529
	DIPTERA CERATOPOGUNIDAE •	20	
	CHIRUNGMIDAE ALL CIPIERA	435	8987 94 00
	EPHEMEROPTERA		
	EPHEMER I DAE EPHEMER A	3	
	HEX AGENTA	4	
	ALL CPHEMEROPTERA		145
	TRICHOPTERA Mystacides	2	
	POLYCEMTROPUS	6	•
	ALL TRICHOPTERA		165
		4	83
	ACARINA		
	GASTRUPCDA AMNICULA	29	
	PHYSA	4	
	VALVATA SINCEPA	1	•
	ALL CASTROPGEA		702
	PELECYPODA		200
	PISICIUM	. 14	289
	ALL PELCCYPOPA	,	269

CATE	OS OF THE ST. MARYS RIVER	Chap Comme	STATION O
CATE	CEPTH(M.) TAXON	GRAB COUNTS:-	MEAN NO./M
2/18/79	1.0 CNIDARIA HYCRA	· 8	165
	ALL CHIDARIA	•	165
	NEMATUCA	12	248
	MIRUDINEA	1	21
	OL IGNCHAETA .	. 306	6322
	POLYCHAETA	·	
	MANAYUNKIA SPECIOSA	63	1302
	ALL POLYCHAETA		1302
	AMPH1PODA	_	
!	HYALELLA	3	62
•	ALL AMPHIPODA		62
	ISOPOCA Asellus	2	41
	**====	2	41
	ALL ISOPODA		41
	D1PTERA CERATOPOGONIDAE	•	
	CHIPGIC IDAE .	7 92	1901
	EMPIDIFAL ALL CIPTERA	10	2262
	•		2252
;	EPHEMEROPTERA EPHEMERIDAE		
	EPHEFERA	3	
	HEXAGEN [1	3	
	ALL EPHENEROPTERA		124
	TRICHOPTERA		
	POLYCENTROPUS	1	21
	ALL TRICHOPTERA .		21
	ACARINA	10	207
	GASTROPODA	04	
	AMN I CCIL A	94	
	GYRAULUS	21	
	HEL I SOMA	1	
	VALVATA TRICARIHATA	6	
	ALL GASTROPODA		2521
	PELECYPODA		
	PISICION	89	1839
	ALL PELECYPORA		1839

CROBENTHOS OF THE ST. MARYS RIVER		•	STATION O	
DATE	DEPTPEM.) TAXCN	GRAB COUNTS	MEAN NO.7M
/18/79	1.0	CNITARIA HYDRA	1	
			•	21
		ALL CNICARIA		21
		HIRUDINEA	1	21
		OLIGOCHAETA	35	723
		AMPHIPODA	,	•
		HYALELLA	1	21
		ALL AMPHIPODA		21
•		ISOPODA LIRCEUS	3	62
			-	
		ALL ISOPODA		62
		DIPTERA CERAIOPOGONIDAS	2	ė
		CHIROMOMIDAE	29	599
		EMPIDIDAC	4	
		ALL DIPTERA		723
		EPHEMEROPTERA		
		EPHENER IDAT		
3		HEXAGEN 1A	ì	
		ALL EPHEMEROPTERA		21
		TRICHOPTERA		
		MYSTACIDES	1	21
		ALL TRICHUPTERA		21
		ACARINA	5	103
		GASTROPODA		
		AMNICULA	15	
		GYRAULUS	1	
		VALVATA SINCERA	12	
		VALVATA TRICARINATA	10	
		ALL GASTROPODA		785
		PELECYPODA		<u>.</u>
		P1510100	26	537
		ALL PELECYPOUA		537

12

248

248

PISICIUM

ALL PELECYPODA

		E ST. MARYS RIVER		STATIUM G
CATE	DEPTH(M	.) TAXAT	GRAE COUNTS	MEAN NG./M
2/17/79	2.0	CNICARIA Hyura	86	1777
		ALL CNIDARIA	•	1777
		RHABDUCCELA	· 2	41
		NEMATODA	4	83
		HIRUDINEA		
		OL IGNO PAETA	67	1384
		POLYCHAETA MANAYUNKIA SPECIOSA	3	62
		ALL POLYCHAETA		62
		OSTRACODA	7	145
		AMPHIPGDA HYALELLA AZTECA	~ 23	475
į		ALL AMPHIPODA		475
		ISOPODA ASELLUS	1	
		LIRCEUS	3	•
		ALL ISOPOCA		83
		DIPTERA CHIRGMGMIDAE EMPIUIDAE	55 5	1136
,		SIMULIIDAF ALL CIPTERA	2	1281
,		EPHEMEROPTERA FPHEMERIOAE		
		EPFCMERA	4	
		HEXAGENIA	· 1	
		ALL EPHEMEROPTERA		103
		TRICHOPTERA MYSTACIDES	5	103
		ALL TRICHOPTERA		103
		ACARITIA	3	62
		GASTROPODA AMNICOLA	119	
		CYPAULUS	17	
		HEL TSCHA	1	
		PHYSA	12	
		VALVATA SINCEPA	75	
		VALVATA TRICARIHATA	79	
		ALL GASTRUPUDA		6260
		PCLECYPEDA P1S1D1UM	58	1198
		ALL PELECYPODA		1198

ACROBENTH	ICS OF TH	IE ST. MARYS RIVER	•	O PULTATE,
DATE	DEPTHIM).) TAXCN	GRAP CCIINTS	PEAN NO./M
2/17/79	1.0	RHABCOCOELA	1	21
		NEMATOCA	3	62
		HIRUCINEA	3	62
		OL IGOCHAETA	97	2004
		POLYCHAETA Manayunkia Speciosa	136	2910
		ALL POLYCHAETA		2810
÷		OSTRACODA	1	21
		AMPHIPODA Hyalella	6	124
		ALL AMPHIPODA		124
		DIPTERA CERATOPOGONIDAE CHIKOMOMIDAE ENPICIDAE ALL DIPTERA	3 233 8	4814 5041
,		TRICHUPTERA POLYCCNIRCPUS	· 1	21
		ALL TRICHOPTERA		21
		ACARINA	3	62
		GASTROPODA AMNICOLA	16	
		GYRAULUS	2	
		HEL ISOMA	2	
		LYMNAEA	.	
		VALVATA SINCFRA	49	
		VALVATA TRICARINATA	62	
		ALL GASTROPODA		2872
		PELECYPOUA PISICIUM	32	661
		ALL PELECYPODA		661

PACKEBENTE	OS OF THE ST. MARYS RIVER		STATION 07
CATE	DEPTHIM.) TAXON	GRAB COUNTS	MEAN NG.ZMZ
2/17/79	1.0 CNIDARIA		
	· HYDRA	4	83
	ALL CNIDARIA		83
	RHABDOCOELA	1 (21
	NEMATOCA	30	620
	HIRUCINEA	. 8	165
	OLIGOCHAETA	275	5681
	POLYCHAETA MANAYUNKIA SPECIOSA	276	5702
	ALL POLYCHAETA	•	5702
	AMPHIPODA GAFMARUS	3	
	HYALFLLA	21	
	ALL AMPHIPCEA		496
:	DIPTERA		
1	CERATOPOGONIDAE CHIRONOMIDAE	10 619	12789
	EMPIDIDAE ALL CIPTERA	4	13078
	EPHEMEROPTERA		
	EPHEMERUPTERA CAENIS	2	
	EPHEMERIDAE .	-	
	EPHEMERA	6	
	HEXAGEN1A .	2	
,	ALL EPHENEROPTERA		207
	LEPICOPTERA	2	41
	TRICHOPTERA	1	
	HYDROPTILIDAE		
	MYSTACIGES	7	
	OEC ET IS	1	
	POLYCENTROPUS	1	
	ALL TRICHOPIERA		237
	ACARINA	9	166
	GASTPOPODA AMRICOLA	143	
		30	
	GYRAULUS		
	HELISOPA	7	
	LYMNSEA	16	
	PHYSA	2	
	VALVATA SINCEPA	. 15	
	VALVATA TRICARIMATA	230	
	ALL GASTROPOLA	-	9152
	PELECYPOUA	70	1411
	PISTOTON	76	1611
	ALL PLLECYPODA		1611

CATE	DEPTH(M.) TAXON		GRAB COUNTS	MEAN NG./MZ
2/16/79	1.0 NEMATOCA		3	62
	HIRUDINEA		1	21
	DLIGOCHAETA	Α	78	1611
	POLYCHAETA	IA COSCINSA	4.3	888
	******	TA SPECIOSA	43	
	ALL POLYCI	MAETA	•	888
	AMPHIPODA HYALELLA	AZTECA	6	124
	ALL AMPHI			124
	1SGPODA	,		
	ASELLUS		1	21
	ALL ISOPOS	AO		21
	DIPTERA			
	CERATOPOG! CHIRONOMI		2	2335
	EMPIUIDAE	OAF	113 7	2337
	ALL CIPTE	3.4		2521
	EPHEMEROPT			
	EPHEMEROPI CAENIS	iena	2	
	EPI ENER LUI	ΔF	•	
	EPHEMERA		5	
	HEXAGENIA		1	
	ALL EPPENI			165
	TRICHOPTER	۸		
	MGL ANNA		1	
	MYSTACIDE		2	
	ALL TRICH			62
	ACAR111A		6	124
	GASTROPOUA			
	AMNICOLA		13	
	GYRAULUS		2	
	HEL ISOMA		3	
	LYPAREA		9	
	VALVATA S		y	
•	VALVATA	TRICARIHATA	. 3	
				806
	PELECYPUUA			
	P1516106		29	599
	ALL PFLECY	PODA	•	599

MACROBENTHOS OF THE ST. MARYS RIVER STATION 09 CATE CEPTH(M.) TAXON --GRAB CCUNTS--MEAN NO./MZ 2/17/79 2.0 CHIDARIA HYCRA 15 310 ALL CHIDARIA 310 NEMATOCA 21 HIRUDINEA 124 OL TGOCHAETA 42 868 PULYCHAETA MANAYUNKIA SPECIOSA 124 ALL POLYCHAETA AMPHIPODA 21 HYALELLA ALL AMPHIPCDA 21 ISOPODA 21 1 LIRCEUS 21 . ALL ISOPODA DIPTERA CHIRUNGHIDAE 1632 EMPICIDAE SIMULTIDAE ALL DIPTERA 1797 EPHEMERUPTERA EPHEMERIDAE EPHEMERA *HEXACENIA* 145 ALL EPHEMEROPTERA TRICHUPTERA OCCETIS **POLYCENTROPUS** 83 ALL TRICHEPTERA GASTROPODA 22 AMN LCOL A 11 GYEAULUS HELISCHA LYBUAEA VOLVATA STRUCTA VALVATA TRICAPINATA 2913 ALL GASTRCPODA PELFCYPOLA 1178 57 PISICIUM 1178 ALL PELECYPOLA

	51			
MACROBENTH	US OF THE ST. MARYS RIVER		STATION 11	
CATE	CEPTH(M.) TAXON	GRAB COUNTS	MEAN NO. /HZ	
2/18/79	1.0 CNIDARIA			
2/10/17	HYCRA	1	21	
	ALL CHIDARIA		21	
	RHARDOCCELA	1	21	
	NEMATOCA	17	351	
	OL 1GGCHAETA	144	2975	
	POLYCHAETA MANAYUNKIA SPECIOSA	27	558	
	ALL POLYCHAETA		558	
	OSTRACCDA	. з	62	
	AMPHIPODA	24	496	
	HYALELLA			
	ALL AMPHIPODA		49 6	
	ISUPODA ASELLUS	1		
,	LIRCEUS	4		
•	ALL ISCPODA		103	
	CIPTERA CERATOPOGONIDAE	11	1074	
	CHIRONONIDAE EMPICIDAE	52 1		
	ALL DIPTERA		1322	
	EPHEMEKOPTERA EPHEMEROPTERA CAENIS •	1		
	EPHEMERIDAE	_		
ŕ	EPHEMERA	1		
	HEXAGENIA	8		
	ALL EPHEMEROPTERA		207	
	COLEDPTERA HALIPLICAS	3	62 62	
	ALL COLEUPTERA		7-2	
	TRICHOPTERA Mystacides	2	41	
	ALL TRICHOPTERA		41	
		3	62	
	ACARINA			
	GASTROPOGA APATOGLA	45		
	GYRAULUS	5		
	HEL I SUMA	3		
	LYPHAEA	1		
	Phy SA	?		
	VALVATA SINCERA	60		
		. 30		
	VALVATA TRICARINATA		3016	
	ALL GASTROPOLA			
	PELECYPODA PISIDIUM	94	1947	
	ALL PELLCYPPILA		1942	
	HUN TENENT			

CATE	DEPTH(M.) TAXON	GRAB CCUNTS	MEAN NO./M
/18/79	1.0 NEMATUCA	18	372
	HIRUDINEA	3	62
	OLIGOCHAETA	199	4111
	POLYCHAETA Manayunkia Speciosa	. 18	372
	ALL POLYCHAETA		372
	OSTRACODA	2	41
	AMPH1PGDA	·	
	HYALELLA	6	124
	ALL AMPHIPODA		124
	ISOPODA		
	ASELLUS	1	21
,	ALL ISTPUDA		21
4	DIPTERA		
	CERATOPOGONIDAE CHIRONOHIDAE	5 10a	2231
	EMPIDIDAE	3	_
	ALL CIPTERA		2397
	EPHEMERUPTERA		
	EPHEMEROPTERA CAENIS	1	
	FOURTHEAT		
	EPHEMERIDAE EPHEMERA *	5	
<u> </u>	HEXAGENIA	8	
,	******	•	289
	ALL EPPEMERUPTERA		
	LEP1DOP1ERA .	1	21
	TRICHOPTERA		124
	MYSTACIDES	6	124
	ALL TRICHUPTERA		124
	ACARINA	2	41
	GASTECPODA	42	
	AMNICOLA		
	GYRAULUS	8	
	HEL ISONA	2	
	LYMWACA	4	
	PHY5A	3	
	VALVATA SINCERA	69	
		68	
	VALVATA TRICARIVATA		4049
	ALL GASTROPHDA	·	707,
	PELECYPODA PISICIUM	106	2190
	+1311 (U)		2193

MACROBENTHOS OF THE ST. MARYS RIVER	•	STATION 13
DATE DEPTH(M.) TAXON	GRAB COUNTS	MEAN NO./HZ
2/18/79 1.0 OLIGOCHAETA	11	227
PULYCHAETA MANAYUNKIA SPECIOSA	1	21
ALL POLYCHAETA		21
OSTRACODA	1	21
DIPTERA CERATOPOGONIDAE CHIRONOMIDAE ALL DIPTERA	1 15	310 331
EPHEMERCPTERA EPHEMELIDAE EPHEMCRA	. 1	
ALL EPHEMEROPTERA	•	21
GASTRUPODA AMNICULA	9	
GYRAULUS	. 7	
HELISOMA	2	
LYMNAEA	1	
VALVATA SINCERA	25	
VALVATA TRICARINATA	72	
ALL GASTROPODA		2397
PELECYPODA PISTCIUM	19	393
ALL PFLECYPODA		393

ZCK! OE !!!	HOS OF THE ST. MARYS RIVER		STATION 1
CATE	DEPTH(M.) TAXON	GRAB COUNTS	MEAN NO./M
2/17/79	2.0 CHIDARIA 'HYGHA	15	310
	ALL CNIDARIA	•	310
	NEMATUCA	2	41
	HIRUDINFA		21
	DLIGOCHAETA	24	496
	POLYCHAETA Manayunkia speciosa	1	21
	ALL POLYCHAETA .	•	21
	OSTRACODA	2	41
	AMPHIPGCA HYALELLA	10	207
	ALL AMPHIPODA		207
4	ISOPODA ASELLUS	i	
	LIRCEUS	3	
	ALL ISOPODA		83 -
	DIPTERA Ceratopogonidae	2	
	CHIROHOMIDAE EMPIDIDAE	79 1	1632
	ALL DIPTERA	•	1694
<u>,,</u>	EPHEMEROPTERA Ephemeridae		
	EPHEMERA	1	
	HEXAGEN IA	2	
	ALL EPHEMEROPTERA		62
	LEPINGPTERA	1	21
	TRICHUPTERA MOLANNA	ı	
	MYSTACINES	3	
	POLYCENTROPUS	2	
	ALL TRICHUPTERA		124
	GASTRUPUDA AMNICOLA	33	
	GYPAULUS	9	
	HZL I SOMA	2	
	PHYSA	1	
	VALVATA SINCERA	31	
	VALVATA TRICAMINATA	. 3	
	ALL GASTROPHOA		1632
	PELECYPODA PISICIUM	31	440
	ALL PELCYPUDA		640

ACROBENT	OS UF TH	E ST. MARYS RIVER	_	STATICH 15
DATE	DEPT+(M	.) TAXON	GRAB COUNTS	MEAN NO./MZ
2/19/79	3.0	CHIDARIA	57	1176
		ALL CNIDARIA		1178
		RHAUDGCUELA	12	246
		NEMATCEA	2	41
		•	•	
		HIRUDINFA	1	21
		OLIGOCHAETA	12	1488
	,	POLYCHAETA Manayunkia speciosa	12	248
	•	ALL POLYCHAETA		248
•		AMPHIPODA		
		GAMMARUS 	1	
		HYALELLA	6	
		ALL AMPHIPODA	·	145
		DIPTERA	,	
		CERATOPUGONIDAE CHIRUNOMIDAE	6 252	5206
		EMPIDIONE ALL DIPTERA	3	5392
,		EPHEMEROP TERA		
,,		EPHEMERIOAE EPHEMERA	3	
			•	
		HEXAGEN! \	18	
		ALL EPHEMEROPTERA	٠	434
		TRICHOPTERA		21
		POLYCENTRUPUS	1	
		ALL TRICHOPTERA		21
		ACARINA	11	221
		GASTROPODA AMNICOLA	63	
		ANTI-COCA	,	
		GYRAULUS	4	
		LYMIACA	2	
		VALVATA TRICARINATA	3	
		ALL GASTRUPUDA		1484
		PELECYPUDA		
		PISICIUM	51	1054
		ALL PELECYPOUA		1054

CATE C	CEPTH(M.) LAXON		
		GRAB COUNTS	MEAN NO./M
/19/79	1.0 RHABDUCOELA	3	62
	TRICLADIDA	14	289
	NEMATUCA	32	661
	HIRUCINEA	4	83
	OL IGOCHAETA	480	9979
	POLYCHA: TA	•	
	MANAYUNKIA SPECIUSA	72	1488
	ALL POLYCHAETA		1488
	AMPH1PGDA		
	GAMMARUS .	2	
	HYALELLA AZTECA	136	
	ALL AMPHIPODA		2851
	ISOPODA		
	ASELLUS	28	
•	LIRCEUS	17	
4	ALL ISUPODA		930
	DIPTERA		
	CERATOPOGOMIDAE Chironomidae	13 808	16693 .
	EMPIDIDAE All Diptera	3	
	EPHEMEROPTERA		17024
	EPHENER I DAE	_	
	EPHEMERA	2	
_	HEXAGENIA	4	
	EPHENERELL IDAE EPHEMERELL A	1	
		•	
	ALL EPHLMEPOPTERA		145
	COLEOPTERA Haliplidae	1	21
	ALL COLEUPTERA	_	21
		••	
	LEPIDOPTERA	33	682
	TRICHOPTERA Mystacides	11	
	POLYCENTROPUS	10	
	ALL TRICHUPTERA		434
	ACARINA	19	393
	GASTRUPCUA AMUTCOLA	62	
	GYRAULUS	50	
	LYMNAEA	1	
	VALVATA SINCERA	. 3	
	VALVATA TRICARINATA	. 2	
	ALL GASTROPODA		2438
	PELECYPHIA		
	P151010M	175	3615
	ALL PELLCYPHDA		3615

CROBENIHOS OF THE ST. MARYS PIVER		57		STATION 17	
DATE	DEPTI-CH	4.) TAXON		GRAB COUNTS	MEAN NO.7M2
119/79	1.0	RHAUDUCTELA		6	124
		TRICLACIDA		1	21
		NEMATCUA		102	2107
		HIRUCINFA		5	103
		OL EGOCHAETA		385	7995
		PULYCHAETA Manayunkia Speciosa		210	4339
		ALL POLYCHAETA		•	4339
		AMPHIPOSA Garmarus		1	
		HYALELLA AZTEGA		71	
		ALL AMPHIPODA		•	1488
		ISOPOUA			
		ASELLUS		6	
		LIRCEUS		3	
		ALL ISOPODA			186
		ÓIPTERA CERATOPOGONIDAE		20	4752
		CHIRONONIDAE EMPIDICAE		230 4	4752
		ALL DIPTERA			5248
		EPHEMEROPTERA EPHEMERIDAE			
		EPHEMERA		2	
		HEXAGENIA		17	
		ALL EPHEMEROPTERA		•	393
	•	L'EPIDOPTÈRA		1	21
		TRICHUPTERA		2	
		MYSTACINES			
		PHYLOCENTROPUS		1	
		POLYCENTROPUS		3	
		ALL TRICHCPTERA			124
		ACAR1%A		15	310
		GASTROPCDA		99	
		AMNICCL A		4	
		GYRAULUS			
		VALVATA SINCEPA		53	
		VALVATA TRICAPINATA		4	
		ALL CASTROPOLA			3306

257

5310 5310

PELECYPOLA PISTOTUM ALL PELECYPODA MACRCHENTHOS OF THE ST. MARYS RIVER

STATION 18

CATE	()41437	*.) PAXUR	GRAB COUNTS	MEAN NO.7M2
2/19/79	1.0	RHABEOCOELA	1	21
		NFHATOCA	14	269
		HIRUDINEA	3	62
		GLIGNCHAETA	104	. 2149
		POLYCHAFT4		
		MANAYU-INIA SPECIUSA	14	289
		ALL POLYCHAFTA		289
		AMPHIPGCA Hyalella	45	93 0
			43	
		ALL AMPHIPCICA		930
		ISOPODA Asellus	2	41
		****	-	•
		ALL ISGPUDA		41
		DIPTERA CERATOPOGONIDAR	25	
		CHIRONCHICAE	86	1777
		ALL CIPTERA		2293
		EPHEMERCPIERA EPHEMERICAE		
		EPHEMERA	3	
		HEXACINIA .	10	
		ALL EPHEMEROPTERA		269
		TRICPUPTERA		
		ASSESSED	2	
		MYSTACINES	5	
		GECETIS	1	
		POLYCENTROPUS	2	
		ALL TRICHOPTERA		207
		ACAR INA	9	186
			4	100
		GASTROPOCA AMOTOCLA	48	
		GYRAUEUS	1	
		HELISCAA	1	
		LYMMAEA	3	
		VALVATA SINCEPA	46	
		VALVATA TRICARIMATA	3	
		ALL GASTROPEDA		2149
		ASTSCANLOV STRICTON	. 122	7521
			122	
		ALL PELECYPLUA	•	2>21

	PERSONAL TAYON	GRAB CCUNTS	MEAN N
CATE	CEPTH(M.) TAXON		
/19/79	3.0 CNIDARIA POPA	14	289
	ALL CNIDARIA		289
	RP4HUDCOELA	3	. 62
	NEMAT ODA	3	62
	HERUDINTA	7	145
	OL IGOCHAETA	122	2521
	COPERUDA	. 7	145
	OSTRACODA	3	ė.
	AMPHIFORA		
	HYALFLLA	12	24
	ALL AMPHIPCUA		74
	150POCA ASELLUS	22	
	LIRCEUS	22	
	ALL ISCPODA		30
	DIPTERA CEPATOPOGONIDAE	15 370	764
	CHTROHOM IDAE EMPICIOAL	7	809
	ALL CIPTERA		007
,*	EPHEMEPOPTERA EPHEMERIDAE	•	
	HEX AGENTA	14	21
	ALL EPHEMEROPTERA	•	2.
	COLEOPTERA	. 1	-
	TRICHCPTEKA Mystacides	5	
	PHYLGCENT®OPUS	9	
	POLYCENTROPUS	4	
	ALL TRICHOPTURA		37
	ACAR IIIA	e	10
	GASTPUPODA		
	AMMICCLA	52	
	GYRAULUS	1	
		e	
	VALVATA SINCERA	17	
	VALVATA TRICARIGATA	1	
	ALL GASTROPCIO		16.
	PELECYPHIA	. 113	23
	PISTOTUM	•••	23.

2010

ALL PILLCYPOOA

PACROBENTI	BOS OF THE ST. MARYS RIVER		STATION 02
CATE	DEPTH(M.) TAXON	GRAB COUNTS	MEAN NO./M2
3/17/79	1.0 CHIDARIA	3	62
	HY CKA	,	02
	ALL CNICARIA		62
	OLIGOCHAETA	24	496
	POLYCHAETA		
	MANAYUN' IA SPECIUSA	1	21
	ALL POLY THATA		21
•	COPEPUCA	3	62
	AMPHIPCCA		
	, PYALELLA	ì	21
	ALL AMPHIPODA		21
	ISOPOUA		
	ASELLUS	1	21
	ALL ISOPODA		21
	DIPTERA		
	CHIRONOMIDAE	72	1488
	EMPIDIONE ALL DIPTERA	2	1529
	ACL DIFFERA	•	.,,,
	· EPHEMERGPTERA		
	EPHFHERIDAE	•	
	EPHEMCRA	1	
	ALL EPFEMERCPTERA		21
	ACAR INA	1	21
	GASTEGPOUA		
	AMH I COL A	30	
	VALVATA SILCERA	12	
	VALVATA TRICAPILATA	2	
	ALL GASTROPODA		909
	PELECYPODA		
	P151C1UM	9	186
	ALL PELECYPODA		186

PACROBENTA	CS OF THE	ST. MARYS RIVER		STATION O
DATE	CCPTECE.) TAXIN	GRAB COUNTS	MEAN NO./K
3/17/79	1.0	OLIGOCHAETA	. 32	661
		POLYCHAETA MANAYONKIA SPECIOSA	1	21
		ALL POLYCHAETA		21
		MANTELL 7	3	62
	,	ALL AUPHIPODA		62
		1SOPOUA ASFLLUS	1	21
		ALL ISOPODA		21
		DIPTERA CERATOPOCOMIDAE CHIROMOMIDAE EMPIUIDAE ALL DIPTERA	1 32 1	661 702
	,	EPHEMLRUPTERA EPHEMERICAE EPHEMERA	1	
		ALL EPHEMEROPTERA		21
		ACARINA	1 .	21
		GASTROPODA APNICOLA	15	
		HELISONA	1	
		LYMNACA	1	
		VALVATA SINCERA	6	
		VALVATA TRICARINATA	1	
		ALL GASTROPUNA		496
		PELECYPODA PISICIUM	7	145
		ALL PELCCYPODA		145

 /17/70	2 ^	L) TAXIM	GRAB COUNTS	
/17/79	2.0	CHIDARIA Hydra	38	785
		ALL CNIDARIA		785
		RHABDOCOEL 4	3	62
		TRICLACIDA	20	413
		NEMATUDA	1	21
			23	
		HIRUCINEA	•	. 475
		ULIGCCHAETA	382	7872
		POLYCHAETA MANAYUMKIA SPECIOSA	1	21
		ALL PCLYCHAETA	•	21
		DSTRACCEA	1	21
		AMPH1PGDA		
		GAI MARUS	. 1	
		HYALELLA	53	
; •		ALL AMPHIPODA		1116
•		ISUPCICA	117	
		ASELLUS	117	
		LIRCEUS	52	*
		ALL ISOPODA Diptera		3492
		CERATOPOGON1DAE	4 4.75	13945
		CHIRDHOMICAE EMPIDICAE	675 1	13747
		SIMULIIDAE ALL DIPTERA	4	14131
2		EPHEMERCPTERA		
		EPHEMEPIDAE HEXAGENIA	3	
		ALL CPHENCROPTERA	-	62
		LEPIDOPTERA	. 2	41
		TRICHOPTERA	•	
		AGRYPNIA	1	
		MYSTACIDES	5	
		PHYLCCENTPOPUS	9	
		POLYCENTROPUS	6	
		ALL TRICHOPTERA		434
		GASTROPODA		
		ANTICGLA	432	
		CAMPELUMA	4	
		GCMICHASIS LIVESCOUS	5	
		GYRAULUS	52	
		HEL I SCH A	1	
		PI:YSA	. 50	
		VALVATA STAGERA	164	
		VALVATA TRICAPINATA	272	
		ALL GASTPEROLA		19607
		PELFCYPCOA		•
		P1511 107	765	5475
		ALL PILECYPCIA		5475

STATION DE	STAT	10N	0.6
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MATTCHENTHOS OF THE ST. PARYS RIVER	64		STATION 06	
TE DEPTECM.) TAXON	64	GRAN COUNTS	HEAN NO./M2	
3/17/79 1.0 PHAPCOCCELA		. 2	41	
NCMATUCA		6	124	
HIRUCTHEA		6	124	
OL IGNCH AFTA		123	2541	
POLYCHAETA			002	
MANAYUNKIA SPECIOSA		48	992	
ALL POLYCHAETA			772	
COPEPOCA		1 · · · ·	. 21	
USTRACCIA		6	124	
AMPHIPCIA Gammarus		1		
HYALELLA AZTECA		9		
ALL AMPHIPODA		•	207	
1 SGPOL A				
ASELLUS		1	21	
ALL ISCPODA			21	
DIPTERA CERALOPOGUNIDAS		4		
CHIRCNOMIDAE		291	6012	
EMPICICAE All Diptema		6	6219	
EPHEKEKUPIEKA EPHEFEROPTERA				
CAFNIS		2		
EPHEPERIDAF EPHEPERA		2		
HEXAGENTA		2		
ALL EPPEMEFOPTERA	•		124	
TRICHOPTERA			264	
HYDROPTILA		1		
MYSTACIDES		1		
POLYCENTPOPUS		2		
ALL TRICHOPTERA			83	
AC AR INA		В	165	
GASTROPFUA				
AMNICCLA		130		
GYRAULUS		8		
HEL ISOMA		8		
LYPNAFA		9		
PFYSA		1		
VALVATA SINCERA	•	14		
VALVATA TRICARI META		65		
ALL GASTROPOLA			4876	
PELECYPODA				
P151(104			1322	
ALL PILECYPOPA			1322	

		•		
DATE	CEPTF(P.) TAXCH	GRAB COUNTS	MEAN NO./HZ	
3/17/79	1.0 CHILARIA	**************************************		
	- MYUKA	32	248	
	ALL CHIDARIA		248	
	NEMATOCA	33	682	
	OL IGGCHACTA.	155	2521 5	
	POLYCHAETA	•		
	MANAYUNKIA SPECTOSA	.275	5401	
	ALL POLYCHAETA	•	5681	
	AMPHIPGCA			
	HAVEFTY 451ECY	81	227	
	ALL APPHIPODA	•	227	
	DIPTERA			
	CERATOPUGONIDAE	•		
	CHIRONCHICAE	. 290	5991	
	EMP 1 0 1 DAE S 1 MUL 1 1 DAE	•		
	ALL DIPTERA	ı	6301	
	, EPHEMEROPTERA			
	· EPHCHERIDAE			
	EPHEMERA	1		
	FEXAGENIA	5		
	ALL EPHENEROPTERA		124	
	LEPIDGPTERA	1	21	
	TRICHOPTERA			
	MYSTACIDES	• •	103	
	ALL IRICHOPTERA	•	123	
	ACARINA WASINUPUUA	•	165	
	AMNICOL A	4.0		
	******	61		
	GYRAULUS	17		
	HEL ISCHA	•		
	****	5		
	LYPNAEA	•		
	VALVATA STUCERA	59		
	VALVATA TRICAPINATA	134		
	All Carrence	•		
	ALL GASTRGPODA		5805	
	PFLECYPUDA PISTOLUR			
		45	930	
	ALL PELECYPHOA		930	

PACRUBENT	HCS OF THE ST. MARYS RIVER	FULTATS		
CATE	CEPTH(M.) TAXON	GRAB COUNTS	MEAN NÔ./H2	
3/17/79	1.0 CHICAKIA PYCRA	5	103	
	ALL CRIDAPIA		103	
	RHABCOCOELA	1	21	
	NEMATODA	6	124	
	HIRUDINEA	· 1	21	
	DLIGOCHAETA	32	661	
	POLYCHAETA MANAYUNKIA SPECIOSA	10	207	
	ALL POLYCHAETA		207	
	COSTRACUDA	1	21	
	AMPHIPODA HYALELLA AZTECA	2	41	
	ALL APPHIPGEA		41	
	DIPTERA CERATOPOGONIDAE CHIRGHEMICAE FMPIDIDAF ALL DIPTERA	. 73 1	, 1508 1611	
	EPHEMEROPTERA FPHEMERIDAE FEXACEMIA	1		
	ALL EPHEMEROPTERA		21	
	TRICHOPTERA POLYCEMTROPUS	1	21	
	ALL TRICHOPTERA		21	
	ACARINA	3	62	
	GASTRUPT DA AMNICOLA	2		
	GYRAULUS	9		
	HELISOMA	1		
	PHYSA	2		
	VALVATA SINCERA	19		
	VALVATA TPICARITATA	· 3		
	ALL GASTPOPPODA		744	
	PELICYPE DA PISTETUR	12	248	
	ALL PILECYPODA		248	

KACROLENTI	HOS OF THE ST	. MARYS RIVER		STATION OS
CATE	CEPTH(M.)	TAXUN	GRAB COUNTS	MEAN NO./M
3/17/79		IDARIA HYCRA	15	310
		LL CNIDARIA		. 310
	RH	ABDGCOELA		21
	н	RUDINEA	2	41
	OL	IGOCHALTA	136	2810
		PHIPOCA	•	
		GAMMARUS	1	
		HYALELLA AZTECA	2	
	A	LL AMPHIPODA		62
	15	OPODA ASELLUS	1	21
;		LL ISCPODA		21
	CI	PTERA		
	Ċ	ERATGPUGUNIUAE HIRONOMIDAE	2 130	2686
	8	MPIGICAE LL DIPTERA	3	2784
		HEMEROPTERA PHEMEPIONE		
		EPHLMERA	2 .	
		hex agenta	16	
"		LL EPHLMEROPTFRA		372
	LE	PIDUPTERA	1	21
	TR	ICHGPTERA		
		FYCRCPTILID/E	1	
		MYSTACIDES	2	
		POLYCENTROPUS	1	
		LL TRICHOPTERA		£; 3
	AC	ARIMA	1	21
	GA	STROPODA AMNICOLA	61	
		GYRAULUS	16	
		*****	18	
		+ CL ISCYA		
		PHY S.A	1	
		VALVATA STREERA	76	
		VALVATA TRICARINATA	64	
	•	EL GASTPI PCCA		4417
	Pf	LECYPULA PISICION	, 56	1157
	,	LL PELECYPPLA		1157

ALL PELECYPPLA

MACROPENTHUS OF	THE ST. MARYS HIVER	68	STATION 11
DATE DEPTI	F(P.) TAXON	GRAH COUNTS	MEAN NO./MZ
3/16/75 1.0	O CHIRARIA HYDRA	4	83
	ALL CHIDARIA		83
	RHABDOCULLA	1	21
	HEMATOCA	11	227
	HIRUDINEA	6	124
•	DLIGUCHAETA	145	3016
	POLYCHAETA MANAYUNKIA SPECIUSA	. 12	248
	ALL POLYCHAETA		248
	AMPHIPODA Garmapus	. 2	
	HYALELLA AZTEGA	34	
	ALL ANPHIPODA		744
	1SOPCCA		
	ASELLUS	1	
	LIRCEUS	4	
	ALL ISOPODA		103
	DIPTERA	24	
	CERATEPOGDHIDAE CHIROHOMIDAE	26 105	2169
	EMPICICAE ALL DIPTERA	5	2810
	EPHEMEROPTERA Ephemeroptera Caenis	. 5	
	EPHLMERIDAE	•	
	· EPHEMERA	2	
	HEXAGENIA	13	
	ALL EPHEMEROPTERA		413
	COLEGPTERA HALIPLIDAF	3	62
	ALL COLEOPTERA		62
	LEPICUPTERA	3	62
	TRICHOPTERA MYSTACIDES	3	
	POLYCENTROPUS	1	
	ALL TRICHEPTERA		83
	ACAPIIIA	3	62
	GASTROPHCA AMATCHLA	36	
•	GAH VAF AZ	8	
	HELISCI'A	3	
	LYPHALA	1	
	PHYSA	6 .	
	VALVATA SINGERA	95	
	ALANTERADIST ATAVJAV	44	
	ALL CASTROPOUA		3987
	PELECYPTICA	4.5	****
	P1511.10P	82	1694
	ALL PLUECYPHINA		1074

PACROEENTHUS OF THE ST. MARYS MIVER			STATION
CATE CEPTHOM.	TAX(IN	GRAB CUUNTS	BEAG NO.
3/16/79 1.0	CHIDAPIA HYCKA	2	41
	ALL CALBARIA	·	41
	RHABLOCUELA	1	21
	NEKATODA	99	2045
	HIRUDINEA	3	62
	OL ICOCHAETA	666	13760
	POLYCHAETA MANAYUMKIA SPECIOSA	139	2872
	ALL POLYCHAETA		2672
	CUPEPGEA	1	21
	ARPHIPCOA		
	GAMMARUS	2	
	HYALFILA AZTECA	12	
,	ALL AMPHIPCUA		269
	ISOPODA ASELLUS	6	
	LIRCEUS	. 7	
	ALL ISCIPODA		269
	CIPICKA CERATOPUGUNIDAE	. 12	
	CHIRONCHICAE EMPIDIDAE	162	3347
	ALL GIPTERA	•	3677
7	EPHCHERCPTEPA EPHCHERIDAE	_	
	EPH-LMERA	3	
	HEXAGEN1A	13	
	ALL EPHSMEROPTERA		331
	COLECPTERA HALIPLICAE	2	41
	ALL COLEGETERA		41
	TRICHUPTERA Hytroptila	2	
	MYSTACILES	9	
	ALL TRICHGPIERA		227
	ACARINA	6	124
	CASTPOPOUA AMALIALA	62	
	***************************************	14	
	GYRAULUS	2	
	FEE ISCHA	1	
	PHYSA		
	VALVATA SHICEPA	50	
	VALVATA TRICARITATA	···	210
	ALL CASTRIBULA		,
	PERCOPPLA PRODUCT	95	1003
	ALL PELLOYPER A		1

MACROBENTHOS OF THE ST. MARYS RIVER				STATICH 13
CATE	CEPTI-(4	I.) TAXCN	GRAB COUNTS	MEAN NO.ZM2
3/16/79	1.0	RHABUGCLELA	- 1	21
		NEMATOCA	2	41
		OLIGOCHAETA	117	2417
		POLYCHAETA		
		MANAYUKKIA SPECIUSA	49	1912
		ALL POLYCHAETA	•	1012
		AMPETPODA Hyalella aztega	5	103
		ALL AMPHIPODA		103
,		ISCPODA		
,		LIRCEUS	2	41
		ALL ISOPODA	•	41
		DIPTERA		
		CERATGPOGONIDAE	4 89	1839
		CHIRONOMIDAE EMPICIDAC	5	1039
		ALL DIPTERA		2025
		EPHEMEROPTERA EPHEMER104E		
		COL There's	2	
		ALL EPHEMEROPTERA		41
		CULEUPTERA		
		FACTPETUAE	. 1	21
		ALL COLEOPTORA		21
		TRICHOPTERA		
		HYSTACIDES	2	
		0808118	1	
		ALL TRICHOPTERA		62
		AC AP 1114	7	145
		GASTRUPUDA AUNICULA	94	
		GYF AULUS	11	•
		FAMILLE	1	
		VALVATA STUCERA	15	
		VALVATA TELEFICIATA	123	
		ALL GASTROPOLA		5041
		PELICYPILA		
		P1510 108	46	950
		ALL PELECYPODA	·	950

PACECELATECS OF THE ST. MARYS KIVER 7.		STATION 14
3/16/79 2.0 CNICARIA	31	640
ALL CRILARIA		640
RHABECCELA	9	166
TRICLACICA	1	21
NEWATCCA	. 61	1260
FIRUCIALA	4	. 63
GLICCCFALTA	231	4772
PCLYCHAITA		
VALAYURKIA SPECIOSE	204	4215
ALL_FCLYCHAETA		4215
CSTRACCCA	14	289
GAMPARUS	1	
. PYALELLA AZTECA	47	
ALL AMPRIPOLA	71	992
* ISCPCEA		776
	13	
ALL JSCPCTA	····	372
DIPTERA		· · · · · · · · · · · · · · · · · · ·
CERATOPO GOMITAE CHIRONOMICAE	35 	6962
EPPICITAS. ALL CIPIERA	3	7747
EPHEMERCETERA	•	
PHEMENICAE	3	
	10	
ALL_EPHENEFCPIERA		269
LEPICCPIERA	3	62
TRICECFIERA		
PYSTACICES	6	
PHYLOCOMIRGPUS	4	
PCLYCENTSCPUS	3	
ALL TRICECPTORA		269
ACARIT.A	24	496
CASTREFELA		The Proper and Control of the Contro
AND LEEL A	108	-
CYKALLUS	41	
FLLISCHA	<u></u> 26	to the second design of the second
1 YE i, 21 5	9	
	2	- ···· - ··
VALVITA SP.CEPA		Aggree of the

ALL CASTRICATION ALL CASTRONAL		5601
*******	124	2562

PACRCECHTHOS OF THE ST. MARYS RIVER STATIO: 15 -- GRAB COUNTS--MEAN NO. 7112 TAXON PLPTF(M.) CAFE 3/16/79 CNIDARIA 3.0 25 516 HYCRA 516 ALL CHIDARIA 41 RHAREOCOLLA NEMATOCA 63 BIRUCINEA 7 145 1901 OL IGOCHALTA 72 POLYCHAETA 393 19 MANAYUNKIA SPECIUSA 393 ALL POLYCHAETA OSTRACODA Ħ 165 AMPHIPODA 2 41 HYALELLA 41 ALL AMPHIPODA DIPTERA CERATEPOGONIDAE 15 CHIRCNOMICAE 268 5537 EMPTLICAE SIPULTIDAE ALL CIPTERA 5971 EPHEMEROPIERA EPHEPERIDAL HEXAGEILLA 11 ALL EPHEFEROPTERA 227 LEPICOPILPA 2 41 TRICHOPIERS PYTREPTIL TOAR MOLANNA MYSTACIDES PHYLECET: TROPUS 145 ALL TRICHOPTERA 186 ACARINA GASTROPCDA 17 ATTRICCEA SYRAULUS FELTSOMA PHYSA 27 VALVATA STUCEPA VALVATA TRICARIMATA 1136 ALL G/SIPIPOLA PELECYPOLA 1136 55 F1510100 1130

ALL PILLCYPLIA

EATE	CEPTH(M.)		73	GRAB COUNTS-	- MEAN NO.ZE
3/16/79			~		
		HYDRA		4	83
		ALL CHIGARIA			83
		RHABENCCELA		7	145
		NEMATODA		6	. 124
		HIRUDINEA		20	413
		OL 160CH45TA	•	268	5537
		POLYCHAFTA MANAYUNKIA SPECIOSA		34	702
		ALL POLYCHAETA			702
		COPERCOA	. ,	1	21
		OSTRACODA		1	21
		AMPHIPEDA FYALELLA		226	4669
		ALL APPHIPUGA	·		4669
•		ISOPCEA ASELLUS		19	
		LIRCEUS		23	
		ALL ISCPODA			868
		DIPTERA CERATOPOGOVIDAE		21	
		CHIRCNOHIDAF		59 9	12375
		EMPICIPAS ALL CIPTERA	•	ź	12651
		EPHEMERCPIERA EPHEMEPIDAS	•		
4		EPHEMERA		3	
		HEXAGENIA		7	
		ALL EPHEPTROPILEA			207
		LEPICOPTERA		33	583
		TRICHOPTERA MYSTACIDES		b	
		PHYLOGENIPOPUS		3	
		PCLYCENTECPUS		16	
		ALL TRICHOPTERA			55 ե
		HEMIPICPA CORIXIDAE		2	41
		ACARINA		33	682
		GASTFOPEDA AMMICCLA		120	
		CAMPELOMA		1	
		GYRAULUS		56	
		LYMADEOS		2	
				. 63	
		WALVATA SPILLRA		9	
		ALL CASSESSES A		,	5221
		MIL CAPIECH II V			
		e1810100		241	4979
		ALL SOLICYPITA			4479

/ACROLENTHO	US GF TH	E ST. MAPYS RIVER		STATION 1
DATE	CEPTHE	•) TAXON	GRAH COUNTS	PEAR NO. /
3/16/79	1.0	RHABDCCCLLA	3	62
		NEMATCLA	18	372
		PIRUDINEA	1	21
		CFICUCEALIA	39	806
		POLYCHACIA MANAYUMKIA SPECIOSA	. 19	393
		ALL POLYCHAETA		393
		OSTRACODA	12	248
		AMPHIPULA GAMMARUS	1	
		HYALELLA AZTECA	51	
		ALL AMPRIPMEN		1074
•		ISOPOCA ASELLUS	11	
•		LIRCEUS	11	
		ALL ISCHUDA		455
		DIPTERA CERATOPOGOUTOAF CHIRCHGMICAS	19 191	3946
		EMPITITAE ALL DIPTERA	2	4380
		EPHELERCPTERA		
4		EPHOMOROPIURA CAENIS	2	
		ΕΡΗΕΛΕΡ10ΔΕ ΕΓΗΕΛΕΚΔ	2	
		HEXAGENIA	6	
		ALL EPHEMERUPTERA		207
		TRICHUPTERA	2	
		NOL ATIMA	3	
		MYSTACIDES	5	
		POR YCEATECPOS	j	207
		ACARINA	8	165
		64514(140,64		
		AFOLIA	6.7	
		648401.05	1	
		VALVATA SINCIRA	71	
		VALVATA THICAPILATA	1	
		ALL CASTROPOLA		2748
		PFLECYPELS PFLECYPELS	. 117	•
			1	
		V61 V (0.10 %	•	

ALL PREFERENCE

MACRERENT	HOS OF TH	E ST. MARYS'RIVER		STATION 18
CATE	DEPTHIR) TAXON	GRAB COUNTS	MEAN HO./M2
3/16/79	1.0	NEMATOCA	5 .	103
		HIRUCINEA	1	21
		OL 1 COCH AETA	125	2582
		POLYCHAETA MANAYUNKIA SPECIOSA	37	764
		ALL POLYCHAETA	•	764
		OSTRACUDA	6	124
		AMPHIPODA	10	222
		PYALFILA AZTECA	18	372
	,	ALL AMPHIPGDA		372
	•	DIPTERA		
		CERATOPOGONIDAE CHIRUNOMIDAE	19 89	1839
		EMPIDIDAE	2	1037
		ALL DIPTERA		2273
		EPHEMEROPTERA		
		EPHEMEROPTEKA CAENIS	1	
		EPHEMERIDAE	_	
		EPHE"ERA	4	
	,	HEX AGEN: IA	11	
		ALL EPHEMEROPTERA		331
		TRICHOPTERA		
		MYSTACIDES	6	124
		ALL TRICHOPTERA	•	124
		HEMIPTERA	_	
		CURIXIDAE ACARIMA	. 1	21
		ARRENURUS	1	
		Oler	10	
		ALL ACAKINA		227
		GASTROPODA		
		AMVICOLA	105	
		LYMIJAEA	2	
		VALVATA SINCERA	7	
		VALVATA TRICARINATA	7	
		ALL GASTEUPUDA		2500
		PELECYPUDA		
		P1S10104	· 84	1735
		ALL PELECYPHUA		1735
			•	,,,,,

CATE	CEPIFIN	.) TAX(N	~~GKAB COUNTS	MEAN NO./A
1/16/79	2.0	CNIDAKIA Hycra	1	21
		ALL CNIDARIA		21
		RHABEOCOELA	ε	165
		TRICLACIDA	41	847
		NEMATODA	51	434
		HIRUDINEA	1	21
		DLIGOCHAETA	154	3162
		POLYCHAFTA MANAYUNKIA SPECIOSA	. 1	21
		ALL POLYCHAFTA		21
		OSTRACCOA	3	62
		AMPHIPODA HYALELLA AZTECA	20	413
		ALL AMPHIPODA		413
,		ISUPGEA ASELLUS	3	
		L IRCEUS	9	
		ALL ISOPLDA		248
		DIPTERA CERATOPOCOMIDAE	34 262	5826
		CHIPC (CMIDAE EMPICICAE	7	6673
		ALL DIPTERA EPHEMERIDAE *		5075
,*		EPHEMERA	2	
		HEXACENTA	20	
		ALL EPHEMARCPTERA		455
		LEPICEPTERA	. 1	21
		TRICHCPTERA MYSTACIDES	13	
		PHYLOCENTRUPUS	3	
		POLYCENTROPUS	5	
		TRIASNOPES	7	
		ALL TRICEGPTIRA	•	578
		HEMIPILON		41
		CONTAC	2	331
		A(4R 1'1A	16	331
		GASTROPT CA ASSIGNES	44	
		GYK, ULUC	3	
		YFY58		
		ναμνατή της «Βγ	<u>.</u> 20	
		VAEVATA 121/1/15 ATA	4	
		ALL 17 (100 1 A		.137
		PELICYPIA	• • •	9.4
		P45.10.16.	139	26.86

CATE	DEPTH(M.)	TAXEN	GRAB COUNTS	MEAN NO
1/16/79	3.0 C	NIDARIA		
		HYURA	. 2	. 41
		ALL CHIGARIA		41
	R	HABDOCCELA	1	21
	1	RICLACIDA	3	62
	N	IEMATORA		434
	•	HRUDINEA	1	21
	O	L IGOCHAETA	105	2169
	c	COPEPUEA	2	41
	0	STRACODA	1	21
,	A	MPHIPCDA		
		HYALELLA AZTECA	3	62
		ALL AMPHIPODA		62
	1	SOPOCA ASELLUS	14	
		LIRCEUS	2	
				331
		ALL ISOPUCA	4	331
3		DIPTERA CERATOPUSONIDAE	.11	
		CHIRCHICATE SEMPTOTOAL	275 2	5681
		ALL DIPTERA EPHENERGPTTRA		5950
		EPHENERIDAE	14	
		HEXAGENTA	16	2.1
		ALL EPHENEROPTERA		331
	1	RICHUPTERA MYSTACIUES	3	
		PHYLOGENTROPUS	9	
		POLYCENTROPUS	3	
		ALL TRICHOPTERA		310
		CART 14	q	186
		GASTROPODA		
	•		35	
		VALVATA SINCEPA	1	
		ALL GASTPOPOUA		744
	ن	PELECYPODA PISTUTUR	·	1059
		6121.40U	, 90 ,	1637

ACREBENTE	GS OF TH	E ST. MARYS RIVER		STATION O
CATE	DEPTHON	.) TAXI-N	GRAB COUNTS	MEAN NO.78
4/19/79	1.0	CHIDARIA HYURA	5	103
		ALL CNIDARIA		103
		NEMATUDA	2	41
		OLICOCHAETA	103	2128
		POLYCHAETA MANAYUKKIA SPECIOSA	46	950
		ALL POLYCHAFTA		950
		OSTRACŪCA	1	21
4		AMPHIPUDA		41
4		PAVEFITY	2	
		ALL AMPHIPODA		41
		LSOPODA ASELLUS	1	21 .
		ALL ISCPUCA		21
		DIPTERA CERATOPOGONIU4E CHIRUMOMIUAE ALL DIPTERA	2 88	1013 1859
3		EPHEMERCPTEPA EPHEMERIUAE	1	
		EPHEMERA		
		HEXACENTA:	Ŀ	
		ALL EPPEMEROPTERA		145
		LEPIDOPTERA	1	21
		ACARIMA	7	145
		GASTROPOGA AMNICOLA	111	
		GYR 40LUS	33	
		LYMMAFA	1	
		PHYSA	1	
		VALVATA SINCERA	35	
		VALVATA INICARIDATA:	23	
		ALL SASTROPODA		4215
		PELECYPUDA P151C1UR	100	2.166
		ALL FELECYPONA		2:166

MACROBENT	MACROBENTHOS OF THE ST. MARYS RIVER		AUI TATE	
CATE	DEPTH(M.)	TAXCH	GRAB COUNTS	MEAN NO.
4/19/79		IICARTA HYDRA	1	21
		LL CNIDARIA		21
	OL	IGCCHAETA	21	434
•	0.5	TRACCOA	1	21
	AF	IPHIPCDA GAMMARUS	1	
		HYALELLA	1	
	,	LL AMPHIPODA		41
		PTERA LIFIRCNOMICAE LNPIGICAE LLL CIPIERA	26 2	537 578
•	E	PHEMEROPTERA PHEMERIDAE EPHLMERA	1	
	4	ALL EPHEMEROPTERA		21
	G	ASTROPOGIA AMNICOLA	17	
		GYRAULUS	2	
		VALVATA TRICARIMATA	3	
	•	ALL GASTRUPODA		455
	Pi	LECYPUDA PISICIUM	2	41
		ALL PELLCYPONA		41

MACRERENTHES OF THE ST. MARYS RIVER				STATION 03
CATE	DEPTHIF.	.) TAXON	GRAB COUNTS	MEAN NG./HZ
4/19/79	1.0	NEMATCEA	1	21
		CL IGOCHAETA	71	1467
		COPEPUCA	1	21
		AMPHIPCDA HYALLLLA	2 `	41
:		ALL AMPHIPODA		41
		DIPTERA CERATOPOGEMIDAE CHIRONOMIDAE ALL DIPTERA	1 91	1880 1901
		EPHEMEPOPTERA BAETISCIDAE BAETISCA	1	
		ALL EPHENEROPTERA		21
		LEPTCOPTERA	1	21
·		ACAPILLA	1	21
		GASTROPLOA AMILOULA	23	
		GUNICHASIS LIVESCEUS	1	
		VALVATA STACERA	17	
		VALVATA IFICARIIATA	7	
		ALL GASTROPODA		492
		PELECYPE DA PE	1	145
		ALL PELCYPOLA		145

ACRUBENTE	CS OF THE S	T. MARYS RIVER	·	STATION O
CATE	DEPTH(N.)	TAXON	GRAB COUNTS	MEAN NO./M
4/19/79	2.0 C	NICARIA HYCRA	1	21
	ı	ALL C'IDARIA		21
	Ri	HABERCOELA	. 1	21
	H	IRUDINEA	1	21
	O	L I GOCHAETA	41	847
	1	SOPODA ASELLUS	1	21
,		ALL ISOPODA		21
•		DIPTERA CERATOPOGOVIDAE CHIRONOMIDAE EMPIDIDAS ALL DIPTERA	4 101 4	2087 2752 _.
		PHEMERCPTERA EPHEMERIDAE CPHEMERA	1	
		ALL EPHENFECPTERA		21
•	G	GASTREPODA AMNICOLA	149	
		GONICHASIS LIVESCENS	2	
		GYRAULUS	4	
		PHY S.A	1	
		VALVATA SINCERA	21	
		VALVATA TRICARIUATA	40	
		ALL GASTROPCEA		4463
	F	PISICIUM PELECYPOCA	111	2293
		ALL PELFCYPULA		2293

-	US OF THE ST. MARYS RIVER		
DATE	DEPTH(M.) TAX(IN	GRAR COUNTS	MEVI NO'N
/19/79	1.0 CNIFARIA	4	83
	ALL CNIDARIA		83
	RHAPDOCOELA	5	103
	NEMATURA	5	103
	HIRUDINEA	4	83
	DLIGOCHACTA	161	3376
	POLYCHAETA		
	MANAYUNKIA SPECIOSA	111	2293
	ALL POLYCHAETA		2293
	AMPHIPOTA	8	165
	HYALFILA AZTECA	· ·	165
,	ALL AMPHIPCUA		100
•	ISUPODA ASELLUS	2	41
	ALL ISOPODA	·	41
	DIPTERA CERATOPOGOMIDAS CHIROMOMIDAS ALL DIPTERA	11 196	4049 4277
	EPHEMERIDAE EPHEMERIDAE EPHEMERA	3	
	HEXAGENTA	L	
	ALL FPIEMCREPTERA		186
	LEPICOPTERA	2	41
	TRICHOPTERA	1	
	MOLANNA	1	
	MYSTACIDES		
	SFTOUFS	•	62
	ALL TOICH PTERA	y	196
	ACARTHA	,	
	GASTROPODA AMNIONEA	8.7	
	GYRAULUS	39	
	RELISONA	11	
	LYMNAEA	b	
	VALVATA SINCERA	214	
	VALVATA TPICASTIATA	159	
	ALL GASTROPOUA		10661
	PECCYPCIA PISTOJUM	157	3244
	ALL PLLECYPOL A		1744

CATE	DEPTH(M.)	TAXON	GRAB COUNTS	MEAN NO.
4/19/79	1.0 Ci	EIDARIA HYCRA	3	62
		ALL CNIDARIA		. 62
	RI	HARDOCPELA	2	41
	N	EMATCDA	2	41
	Ol	LIGOCHAETA	36	744
	P	GLYCHAETA	•	
		MANAYUNKIA SPECIOSA	32	661
	•	ALL PULYCHAFTA		661
	C	DPEPLCA	1	21
	0:	STRACHDA	4	83
₹	A	MPHIPGDA	10	207
		HYALELLA	10	207
		ALL AMPHIPCCA		201
	I.	SOPODA ASFLLUS	1	21
		ALL ISPPORA		21
		IPTERA .	_	
		CERATOPUGONIDAS CHIRONOMICAS	2 78	1611
,•		EMPIUICAE ALL DIPTERA	2	1694
	ŧ.	EPIUOPTERA	3	62
	Т	RICHLPTERA		
		HYDROPTILA	1	
		MOLARMA	2	
		TRIAENUDES	1	
		ALL TRICHUPTERA		83
	Δ	CARIHA	6	124
	G	ASTROPODA AMNICULA	27	
		CYRAULUS	26	
		LYMNAFA	8	
		VALVATA SINCERA	21	
		VALVATA TRICAFINATA	41.	
		ALL GASTROPOGA		2541
	P	FLECYPODA PISTCIUM	16	331
		ALL PELLCYPULA		931

PACROBENTI	HOS UF THE ST. MARYS RIVER		STATION OF
CATE	DEPTH(M.) TAXUN	URAB CCUNTS	MEAN NO./ME
4/19/79	1.0 CNIGARIA HYDRA	4	83
	ALL CMIDARIA		83
	CLIGOCHAETA	. 24	496
	POLYCHAETA MANAYUMKIA SPECIOSA	5	103
	ALL POLYCHAETA		193
	COPEPODA	1	21
;	OSTRACCDA	5	103
`	AMPHIPCDA HYALELLA	3	62
	ALL AMPHIPUDA		62
	DIPTERA CERATOPOGONIDAE CHIRONOSIDAE LIPPIDIDAE	1 68 3	14)5
	ALL CIPTERA	•	1488
	TRICEOPTERA MYSTACIDES	1	21
	ALL TRICHPPTERA		21
	ACARINA	1	21
	GASTROPODA AMNICCE A	25	
	GYRAULUS	15	
	LYNIAFA	4	
	VALVATA SINCEPA	A	
	VALVATA TRICASTINATA	21	
	ALL GASTECPOIN		1508
	PFLSCYPUDA PISTCIUR	16	2:07
	ALL PELCYPODA		207

	nemana a manan		
CATE	OEPTH(M.) TAXON	GRAB COUNTS	UN MASM
/14/79	2.0 CMIPARIA HYDRA	1	21
	ALL CNIDARIA	-	21
	HIRUDINEA	2	41
	OL I GOCHAETA	. 21	434
	POLYCHAETA MANAYUNKIA SPECIOSA	10	207
	ALL POLYCHAETA		207
	AMPHIPODA HYALFELA AZTECA	. 1	21
	ALL AMPHIPODA		21
	DIPTERA		
	CERATOPOGONIDAE CHIRONOMIDAE	2 33	662
	ALL DIPTERA	33	723
	EPHEMEROPTERA		
	EPHEMERIDAS BEXAGENIA	1	
	ALL EPHEHEROPTEKA	•	21
	1R1CHOPTER4		
	MYSTACIDES	1	21
	ALL TRICHOPTURA		21
	AC AR IN A	2	41
	GASTRUPOUA		
,	ATIN I COL A	28	
	GYRAULUS	1	
	FEL I SCHA	6	
	LYMNAEA	1	
	PHYSA	i	
	VALVATA SINGERA	12	
	VALVATA TRIGARIMATA	33	
	ALL GASTRI PODA		1694
	PELECYPLOA		
	PISTCTOM	11	227

PACRCHENTHOS OF THE ST. MARYS RIVER

STATION 11

DATE	DEPTH (M.)		GRAB CUUTITS	MEAH NO./M2
4/16/79	1.0	RHABDOCOELA	1	21
		NEMATOCA	32	661
		HIRUCINEA	3	62
		OL IGOCHAFTA	111	2293
		POLYCHAETA		
		MANAYUNKIA SPECIUSA	41	847
		ALL POLYCHAETA		847
		AMPHIPODA FYALELLA	10	207
		ALL APPHIPODA		207
	•	1500004	_	
		LIRCEUS	2	41
•		ALL ISOPODA		41
		CERATOPOGONIDAE	4	
		CHIRUNEMIDAE EMPIDIDAE	52 2	1074
		ALL CIPTERA	. •	1198
		EPHENEROPTERA EPHENEPOPTERA		
		CAEHIS	1	
		EPHEMERIDAE .	•	
4		EPHELERA	1	
		HEXACC. 14	5	
		ALL CPHEMEPURTERA		145
		COLEOPTIRA HALIPLICAE	1	21
		ALL COLEGRIFRA		21
		TRICHCPIERA		
		MYSTACIDES	1	
		POLYCONTROPOS	1	
		TRIASHODES	1	
		ALL TRICICPTERA		62
		GASTROPOLA AMBICCEA	15	
		GYFAULUS	3	
		PRYSA	2	
		***	15	
		VALVATA SINCERA	7	
		VALVATA TA ICAPILATA	•	1.65
		ALL GASTRIPCHA .		•
		NISTCTOR ALTCASE OF	79	597
		ALL PILLOYPODA		599

CATE	DEPTH (M.) TAXON	GRAS COUNTS	MEAN NO./M
4/18/79	1.0 CNICAR!A HYCRA	3	62
	-+	•	
	ALL CHIGARIA	_	62
	RHAPDCCGLLA	2	41
	HEMATOCA	50	1033
	HIRUDINEA		. 62
	CLIGOCHAETA	494	10206
	PCLYCHAETA MANAYUNKIA SPECIOSA	233	4814
	ALL POLYCHACIA		4814
	OSTRACODA	3	62
	AMPHIPCCA Hyalella aztèca	13	269
	ALL AMPHIPUCA	••	269
	ISOPODA		20,
1	ASFLLUS	1	
	LIRCEUS	3	
	ALL ISOPODA		83 .
	DIPTERA	11	
	CHIRONOMIDAE CHIRONOMIDAE	112	2314
	EMPICIDAE ALL DIPTERA	7	2586
	EPHEMERCPTELA		
	EPHEMERA EPHEMERA	4	
	AIMPEAAH	e	
	ALL EPHEMEROPTERA		248
	LEPIDOPTEPA	1	21
	TRICHOPTERA	•	67
	MYSTACIDES	3	
	ALL TRICHEPIERA	•	62 41
	ACAPINA	2	71
	GASTROPELA AMELCOLA	32	
	GYR AULUS	10	
	HELISCHA	4	
	LYEVALA	1	
	VALVATA STICEPA	52	
	VALVATA TPICAPINATA	63	
	ALL GASTPUPOVA		3347
	PFLICYPTIA	10,	2140
	P151C10F	104	2149
	ALL PELLCYPGIA		2149

ACKCBENTH	GS OF THE	ST. MARYS RIVER		STATION 1	
CATE	CEPTE (H.	.) TAXUI	GRAB COUNTS	MEAN NO.ZH	
4/18/79	1.0	RHABDOCOEL A	1	21	
		NEMATODA	. 1	21	
		HIRUCINLA	3	62	
		OLIGOCHASTA	73	1508	
		PGLYCHAETA MANAYUNKTA SPECIOSA	11	227	
		ALL POLYCHAETA		227	
		AMPHIPCD4 GAMMARUS	1		
		HYALELLA	15		
1		ALL APPHIPCDA		331	
		DIPTERA			
		CHIPONOMICAE FMPIDIDAF	82 4	1694	
		ALL CIPTERA	·	1777	
		EPHEMEROPTERA			
		EPHENERIDAE HEXAGENIA	1		
		ALL EPHEMEROPTERA	•	21	
				2.1	
		TRICHCPTERA NOLANHA	ì		
,					
		MYSTACIOES	2		
		ALL TRICHUPTERA		62	
		ACARINA	_. 5	103	
		GASTROPCOA AMMICOLA	102		
		GYRAULUS	1		
		HEL ISONA	1		
		LYNGIAEA	5		
		PHYSA	1		
		VALVATA STICCEA	75		
		VALVATA THICAPINATA	173		
		ALL GASTROPOLA		7396	
		PELSCYPTIA			
		P1S1010n	87	1797	
		ALL PELECYPODA		1777	

PACKUMENTHES	OF THE ST. HAMYS RIVER		Station 14
CALC C	EP16(4.) 1240d	GRAB COURTS	MENN NO.ZMZ
4/20/19	2.0 CHIUARIA Hyura	15	310
	ALL CULDARIA	`	310
	RHANCOCUCLA	15	310
	TRICLACIOA	•	8-3
	NEMERTINEA	1	21
	NEMATROA	58	3411
	HERUCTILEA	9	136
	OL IGOCHAETA	532	10991
	POLYCHALTA	•	•
	MANAYUNKIA SPECIOSA	13	269
	ALL POLYCHALIA		269
	OSTRACCIA		289
	AMPHIPCEA Sammarus	1	
	MANTERTY WELECT	51	
	ALL AMPHIPODA		1074
	ISCPOLA		
1	ASELLUS	4	
•	LIRCEUS	13	25.
	ALL ISCPCOA CIPTERA		351
•	CERATOPHICATURE CHIPCHONE	27 350	7231 -
	EMPIGIFAE ALL DIPTERA	4	7871
	EPHONOPOPTERA		
	EPELMEPUPTORA CAEMIS	1	
	EPFEL EPTUAF	•	
*	CSEFAFOR	2	
	HEXAGEN1A	16	
	ALL SPRUMEROPTERA		393
	COLECPTER: CYTISCIUAE	1	21
	ALL COLEUPTERA		21
	LEPICOPTERA	7	145
	TRICHMPIERY	_	
	MYSTACIDES	7	
	CHOEFIS	1	
	PHYLOGENTROPUS	1	
	POLYCENTACHOS	·	310
	ALL TO ICHOPINA		455
	1624144 64514(Pros4	72	455
	amiliane a	4*	
	CVERFIEL	1	
	GYPAULUS	. 3t	
	FILLIAN .	. *	
	[Y 17] 1 A	i	
	+ 1· V ' - N	٠	
	VARIANCE VILLERA	1.7	
	APANTA TOTAL STA		
	Mariovite on S		4.1.3
	0047400 0 0174 10	136	2410

MACRUBENTHOS OF THE ST. MARYS RIVER

CATE	DEPTHIM.) TAX(N	GRAB COUNTS	MEAN HO.7M2
4/20/79	3.0	CHIDARIA HYDRA	2	41
		ALL CHIDARIA		41
,		RHABDOCOELA	6	124
•		NEMERTINEA	1	21
		HEMATOCA	58	1198
		OLIGOCHAETA	178	3677 ,
		POLYCHAETA	2	41
		OSTPACGEA	ε	165
		AMPHIPCOA HYZLELLA AZTECA	2	41
, ,		ALL AMPHIPCOA		41
		CIPTERA CHIRONERIDAE EMPLOIDAE ALL DIPTERA	294 3	6074 6136
	•	TRICHOPTERA CPEUMATUPSYCHE	1	
		PHYLOCENTPOPUS	1	
		ALL TRICHOPIERA		41
		ACAPINA	2	41
		GASTROPONA CAMPELUMA	1	
		VALVATA STACEPA	1	
		ALL GASTROFOLA		41
		PELFCYPODA PISICIOS	56	1157
		ALL PELECYPOLA		1157

STATION 15

C RCBENTHO	OS OF TH	ST. PARYS RIVER		STATE
5 1 4 G	DEPTHIP	.) TAXO:.	GRAB CCUNTS	PE AN
/18/79	1.0	8H4bUUCOEL 4	17	35
		NEMERTINEA	1	2
		NEMATUCA	57	117
		HIRUDINFA	21	43
		DLIGOCHAETA	941	1944
		PULYCHACTA MANAYUNKIN SPECIOSA	35	72
		ALI PULYCHAETA		72
		OSTRACODA	3	
		AMPH IPCDA		
		GAMMARUS	1	
		HYALFILA AZTECA	203	
		ALL AMPHIPODA		42
,		ISOPUDA ASELLUS	16	
•		LIRCEUS	12	
		ALL ISCPUDA		5
		DIPTERA		_
		CERATUPOGONIDAE CHIRONOMIDAE	37 564	116
		EMPICIONE ALL CIPTERA	3	124
		FPHENER(IPTERA		124
		EPHEMERIDAE EPHEMERA	1	
.•		HEXAGENIA	8	
		ALL EPHEMERUPTERA		1
		LEPIDOPTEKA	15	3
		TRICHOPIERA		
		MYSTACIDES	23	
		PHYLCCENTROPUS	4	
		POLYGENTROPUS	12	
		TRIAENODES	1	
		ALL TRICHOPTIRA		е
		HEHIPTERA CURIXIFAE	4	
		ACAP11.A	16	7
		GASTROPPI A AMRICCUA	14	
		GYRAULUS	17	
		PHYSA	2	
		VALVATA SINCIPA	22	
		VALVALA TELEGRICATA	. 1	
		ALL GASTPOPOGA	•	11
				••
		MISITION BELLCARGES	74	5
		811 - P11 : CYPP (I.A.		٠,

•	CS OF THE ST. MARYS RIVER		STATION 1
CATE	DEPTH(M.) TAXUN	GRAB COUNTS	MEAN NO.7M
/18/79	1.0 RHABBUCGELA	4	£ 3
	NEMATODA	18	372
	HIRUCINEA	3	62
	OLIGOCHAETA	. 177	3657
	POLYCHAETA MANAYUNKIA SPECIOSA	81	1673
	ALL POLYCHAETA		1673
	DSTRACECA	. 6	124
	AMPHIPOOA Hyalella	27	558
	ALL AMPHIPODA		558
	ISCPOCA Lirceus	3	62
4	ALL ISCPUCA		62
•	DIPTERA CERATOPOGONIDAE	10	1764
	CHIRCHCHICAE ALL DIPTERA	85	1756 1963.
	EPHEMERCPTEPA EPHEMERIDAE	_	
	EPHEMCRA	5	
	HEXAGENIA	17	
	ALL EPPEMEROPTERA		455
,	TRICHUPTERA MCLANNA	1	
	MYSTACIDES	1	
	OCCETIS	1	
	POLYCENTRUPUS	1	
	TRIACMODES	1	
	ALL TRICECPTERA		103
	HEMIPTERA		21
	CORIXICAE	1	83
	ACARTHA	•	
	GASTELPEDA AMUTCOLA	46	
	GYRAULUS	3	
	HELISONA	1	
	LYNMAFA	ì	
	VALVATA STACEPA	6	
		2	
	ALL GASTKUPLUA	,	1219
	PELNCYPFIIA		1901
	0151310M	'12	1901

CATE .	CEPTH(M.) TAXIN	GRAB CCU-ITS	MEAN N
/16/79	1.0 RHABDUCUELA		
7 4 WF 17		1	21
	NEMATOCA	13	269
	HIRUDINEA	4	83
	DLIGOCHAETA	212	4380
	POLYCHAFTA MANAYURKIA SPECIOSA		2252
	ALL POLYCHAETA	•	2252
	DSTRACODA	9	166
	AMPHIPODA FYALELLA AZTECA	. 25	516
	ALL AMPHIPODA		516
	CIPTERA CEPATOPOGO', IDAE CHIRONOMIDAE ALL DIPTERA	6 118	2438 2562
,	EPHEMERGPILRA Ephemeridae Ephemera	. 2	
	HEX AGEN I A	7	
		•	
	ALL EPHEMEPOPTERA		180
	TRICHOPTERA Mulanha	· . 2	
	MYSTACTUES	10	
	OECETIS	1	
.*	ALL TRICHOPTERA	-	269
	ACAR I NA	5	10:
	GASTROPODA ARGICOLA	98	• • •
	HELISOMA	. 1	
	VALVATA SINCERA	14	
	VALVATA TRICARIMATA	4	
	ALL GASTRUPUDA	·	241
	PELECYPODA PISICIUM	122	252
	ALL PELECYPOLA	166	252

MACRUBENTHUS OF THE ST. MARYS RIVER STATION 19 DATE CEPTH(M.) TAYON --GRAB COUNTS--#E44 NU. 1"2 4/18/79 2.0 RHABCOCCELA 2 41 NEMATODA 10 207 HIRUCINEA 4 63 DL IGUCHAETA 163 3366 POLYCHALTA MANAYUNK IA SPECIOSA 25 516 ALL POLYCHAETA 516 COPEPOCA 1 21 DSTRACTOR 21 AMPHIPCUA GAMP ARUS FYALELLA AZTECA ALL AMPHIPCDA 558 **ISOPUCA** LIRCELS 2 41 ALL ISCPUDA 41 DIPTERA CERATOPOGONIDAE CHIRCHERIDAS 135 2789 EMPTOTOAE ALL EIPIERA 2996 EPHEMERIPTERA **EPHEMERIDAE** EPHEMERA HEXAGERIA ALL EPHELL ROPTERA 145 TRICHOPTERA OFCETIS 1 PULYCENTRUPUS 3 ALL TRICHOPTERA 6.3 HEMIPTERA CORIXIDAE 21 ACARINA 5 103 GASTRUPUDA ATRICULA 59 GYRAULUS 2 **FELISTIA** LYHNAEA VALVATA STICERA 15 VALVATA TETCARTATA 11

1680

847

947

41

ALL CASTPOPUNA

ALL PELECYPOPA

PELCCYPLUA PISTULUM

CA1 E	CEPTH (P.) TAXON	GRAB COUNTS	N.ON NASM
/18/79	3.0 RHABBUCUEL 4	7	145
	TRICLACIUA	5	103
	NEMATOCA	5	103
	OLIGOCHAETA	96	1983
	POLYCHAETA MANAYUNKIA SPECIUSA	3	. 62
	ALL POLYCHAETA		62
	OSTRACCOA	21	434
	AMPHIPCCA		
	HYALFLLA AZTECA	17	351
	ALL AMPHIPODA		351
	1SOPODA Lirceus	· 3	62
	****	·	62
	ALL ISOPOUA	•	or.
,	DIPTERA CERATOPUGUNIDAE	9	>300
	CHIRONOMIDAE EMPIDIDAE	135 1	2789
	ALL DIPTERA		2996
	EPHEMEPOPTERA Ephemeredae		_
	EPHENERA	2	
	HEX AGEN IA	10	
	ALL EPHEMEROPTERA	•	248
3	COLECPTERA HALIPLIDAE	1	21
	ALL COLEGPTERA		21
	TRICHOPTERS		
	MYSTACIDES	11	
	DECETIS	1	
	POLYCENTROPUS	2	
	ALL TRICHCPTERA	•	289
	HEMIPTEKA CCRIXIDAE	2	41
	ACARINA	13	269
	GASTROPOUA	••	•
	AMMICOLA	45	
	GYRALLUS	7	
	HEL I SCHA	3	
	PIYSA	1	
	VALVATA STREERA	18	
	VALVATA IRICARITATA	. 6	
	ALL GASTROPODA	•	1653
	PELEGYPCUA		
	P1510109	. 157	3244

Appendix 2. Drift net catches at Frechette Point and Six Mile Point in the St. Marys River, February 15-April 21, 1979.

Catches in drift nets fished at the Frechette Point high impact site, February 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm²; detritus is dry weight in grams.]

			ts fished			
		2/15	2/15-16		2/16	
Station	Component	0900-	1700-	1030-	1230-	1400-
number	of catch	1700	1030	1230	1400	1600
	Macroinvertebrates					
7a	Mysis relicta	0	13	0	0	0
	Gyraulus	0	0	2	0	0
	Caenis	0	0	0	1	0
	Paraleptophlebia	0	0	0	0	1
	Chironomidae	0	0	0	1	0
7 b	Mysis relicta	0	1	0	0	0
	Gammarus	0	1	0	0	0
	Gyraulus	0	0	0	0	1
	Valvata sincera	0	0	10	0	0
	Hydra	0	0	0	28	27
	Hexagenia	0	Ż	0	0	0
	Mystacides	0	. 0	0	2	0
	Chironomidae	0	0	6	5	1
7c	Chironomidae	0	0	0	1	0
	Oligochaeta	0	0	1	0	0
	Hydra	0	0	12	38	27
7d	Hydra	0	0	51	5	4
	Mystacides	0	0	0	2	0
	Chrionomidae	0	0	5	1	6
Total ma	croinvertebrate catch	0	17	87	84	67
	Macrophytes					
7a		0	0	39.0	114.2	124.6
7 b		0	0	19.6	45.8	133.4
7c		0	0	0	0	1.4
7d		0	0	0	0	78.4
Total ma	crophyte catch	. 0	0	58.6	160.0	337.8

(table continued)

			Dates an	d hours ne	nets fished	
		2/15	2/15-16		2/16	
Station	Component	0900-	1700-	1030-	1230-,	1400-
number	of catch	1700	1030	1230	1400	1600
	Detritus					
7a		0.099	0.456	0.044	1.103	0.109
7b		0.175	0.368	0.384	5.497	0.971
7c		0.194	0.506	0.952	11.058	0.468
7d		0.093	1.226	0.522	14.643	0.719
Total de	tritus catch	0.561	2.556	1.902	32.301	2.267
	Fish					
7đ	Cottus spp.	0	1	0	0	0

Catches in drift nets fished at the Frechette Point high impact site, March 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in $\rm cm^2$; detritus is dry weight in grams.]

		Dates and hours nets fished			
		3/13-14	3/14	3/17-19	
Station	n Component	1515-	1030-	1445-	
number	of catch	1030	1730	0 900	
	Macroinvertebrates				
7	Hirudinea	0	1	0	
	Ephemera	0	1	0	
	Agrypnia	1	0	0	
9 .	Chaoborus	0	1	0	
10		0	0	0	
Total ma	acroinvertebrate catch	1	3	0	
	Macrophytes				
7		22.20	252.92	0	
9.		6.40	0	104.48	
10		96.56	18.82	21.00	
Potal ma	acrophyte catch	125.16	271.74	125.48	
	Detritus				
7		1.227	4.657	2.441	
9		0.877	8.839	1.407	
10		1.092	2.706	2.489	
rotal de	etritus weight	3.196	16.202	6.337	

Catches in drift nets fished at Frechette Point low impact site, March 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm²; detritus is dry weight in grams.]

			nd hours nets f		
		3/13-14	3/14	3/17-18	
Station	Component	1500-	0930-	1500-	
number	of catch	0930	1745	1000	
	Macroinvertebrates				
2		0	0	0	
4	Amnicola	0	0	3	
	Physa	0	0	1	
	Lirceus	1	1	0	
	Hydracarina	1	0	0	
•	Simulidae	4	0	0	
	Chironomidae	2	0	0	
5	Gammarus	1	o	0	
	Hexagenia	1	0	0	
	Baetidae	1	0	0	
	Simulidae	3	0	0	
Total mad	croinvertebrate catch	14	1	4	
	Macrophytes				
2		0	0	0	
2 4		0	16.80	53.26	
5		0	2.42	0	
5			2.42		
Total mad	crophyte catch	0	19.22	53.26	
	Detritus				
2		0.112	3.666	0.478	
4		0.402	0.175	0.544	
5		0.763	0.934	0.471	
Total de	tritus weight	1.277	4.775	1.493	
***************************************	Fish				
4	Cottus spp.	0	0	1	

Catches in drift nets fished at the Frechette Point high impact site, April 1979. [Macroinvertebrates and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm²; detritus is dry weight in grams.]

			and hours nets f.	
		4/20-21	4/2	
Station	Component	1600~	1330-	1530-
number	of catch	1330	1530	1730
	Macroinvertebrates			
7		0	0	0
9	<u>Hexagenia</u>	0	1	0
10		0	0	0
Total macroinvertebrate catch		0	1	0
	Macrophytes	······································	 	
7		O	0	0
9		0 .	9.88	0
10		0	0	0
Total ma	crophyte catch	0	9.88	0
	Detritus			
7		o	0	0
9		14.083	3.506	2.029
10		0	0	0
motal do	tritus weight	14.083	3.506	2.029

Catches in drift nets fished at the Frechette Point low impact site, April 1979. [Macroinvertebrates and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm²; detritus is dry weight in grams.]

			Dates and	hours net	s fished	
		4/20-21		4/2	1	
Station	Component	1500-	0930-	1100-	1300~	1500-
number	of catch	0930	1100	1300	1500	1700
	Macroinvertebrates					
2	Mysis relicta	1	0	1	0	0
	Baetisca	0	0	1	0	0
	Chironomidae	0	0	1	0	0
4	Hexagenia	0	3	1	0	0
	Ephemera	0	3	0	0	0
	Chironomidae	0	0	1	0	0
5	Campeloma	0	1	0	0	0
	Hexagenia	0	3	0	0	0
Total ma	croinvertebrate catch	1	10	5	0	0
						
,	Macrophytes					
2		0	0	0	10.84	14.14
4		0	0	2.90	0	0
5		0	0	0	0	0
Total ma	crophyte catch	0	0	2.90	10.84	14.14
	Detritus					
2		3.810	0.846	0.204	0.549	0.562
4		1.772	15.209	0.511	0.122	0.295
5		0.770	1.464	0.289	0.701	1.312
	tritus weight	6.359	17.519	1.004	1.372	2.169

Catches in drift nets fished at the Six Mile Point high impact site, March 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in $\rm cm^2$; detritus is dry weight in grams.]

		Dates and hours nets fished '			
		3/13-14	3/14	3/17-18	
Station	Component	1545-	1045-	1415-	
number	of catch	1045	1715	0930	
	Macroinvertebrates				
12	Physa	1	0	O	
14		0	0	0	
15		0	0	0	
Total mad	croinvertebrate catch	1	0	0	
	Macrophytes	····		 	
12		107.28	90.48	144.22	
14		17.12	34.62	0	
15		52.76	5.86	12.36	
Total made	crophyte catch	177.16	130.96	156.58	
	Detritus	<u></u>	*************************************		
12		0.045	0.095	0.013	
14		0.238	0.242	0.307	
15		0.211	0.100	0.074	
Total de	tritus weight	0.494	0.437	0.394	

Catches in drift nets fished at the Six Mile Point low impact site, March 1979. [Macroinvertebrate and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm²; detritus is dry weight in grams.]

		Dates a	nd hours nets f	ished ·
		3/13-14	3/14	3/17-18
Station	Component	1615-	1130-	1400-
number	of catch	1130	1700	0915
	Macroinvertebrates			
17	Corixidae	0	ı	0
	Lirceus	1	0	0
19	Amnicola	ı	0	0
	Mysis relicta	3	0	2
20	Physa	0	1	0
	Mysis relicta	1	0	1
Ison	Isonychia	0	0	1
Total ma	croinvertebrate catch	6	2	4
17 19	Macrophytes	21.32	83.32 14.12	0
20		25.98	5.48	o
Total ma	crophyte catch	47.30	102.92	0
	Detritus			
17		0.085	0.269	0.407
19		0.459	1.453	0.238
20		1.172	1.738	0.833
Total de	tritus weight	1.716	3.460	1.478

Appendix 3. Record of vessel passage made through the St. Marys River for January 16-19, February 13-19, March 11-18, and April 18-21, 1979.

Catches in drift nets fished at the Six Mile Point high impact site, April 1979. [Macroinvertebrates and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in $\rm cm^2$; detritus is dry weight in grams.]

			s nets fished
Station	Component		′21
number	of catch	1400-1600	1600-1800
	Macroinvertebrates		
12		0 .	0
14		0	0
15		0	0
Total mac	roinvertebrate catch	0	0
	Macrophytes		.
12		1.44	82.20
14		0	0
15		0	0
rotal mac	erophyte catch	1.44	82.20
	Detritus	*- <u></u>	
12		3.655	0.109
14		0	0
15		1.164	0.675
rotal det	ritus weight	4.819	0.784

Catches in drift nets fished at the Six Mile Point low impact site, April 1979. [Macroinvertebrates and fish catches are shown in numbers of individuals; macrophyte catch is plant material surface area in cm²; detritus is dry weight in grams.]

		Dates and hours nets fished		
Station	Component		/21	
number	of catch	1430-1630	1630-1830	
	Macroinvertebrates			
17		О .	0	
19	Amnicola	0	1	
	Lirceus	0	1	
	Chironomidae	0	1	
20 ;		0	o	
Total mac	roinvertebrate catch	0	3	
	Macrophytes			
17		0	0	
19		• 0	10.58	
20 '		0	0	
Total mac	rophyte catch	0	10.58	
	Detritus		<u>,,</u>	
17		0	0	
19		0.071	0.308	
20		0.050	0.009	
Total det	ritus weight	0.121	0.317	

Record of vessel passage made through the St. Marys River for January 16-19, February 13-19, March 11-18, and April 18-21, 1979. [U.S. Coast Guard Radio Log data provided by telephone, July 16, 1979, by QM 1C, K. Andrea, U.S. Coast Guard Station, Sault Ste. Marie, Michigan; (a) estimate provided by K. Andrea; (b) data from Alger, 1979.]

			Date reported	vessel es observed	and Time timated (a)/ (b) reachin Ny area
Date	Vessel Name	Direction	reaching Nine Mile Point	Date	Time
		unhound	22:29		
1/16	Presque Isle	upbound	22:29		
	A.M. Anderson	upbound	22:46		
- 40 -	A.H. Ferbert	upbound			
1/17	W. Cohen	upbound	17:28	2/16	12:50 ^b
2/15	P.R. Clarke	upbound	23:11	*	12:30 13:04 ^b
	C.J. Callaway	upbound	23:25	2/16	
2/16	J.G. Munson	upbound	09:39	2/16	13:28 ^b
3/11	A.M. Anderson	upbound	13:14	3/13	09:00 a
	P.R. Clarke	upbound	13:23	3/13	09:15 a
3/14	Imperial St. Clair	upbound	. 10:20	3/14	11:02 ^b
	C.J. Callaway	downbound	10:46		
	R. Blough	downbound	16:26		
3/18	Imperial St. Clair	downbound	06:23		
	C.J. Callaway	upbound	18:30		
	R. Blough	upbound	23:12		
4/18	R. Blough	downbound	09:00		
	C.J. Callaway	downbound	09:53		
	Fort Chambly	downbound	10:21		
	J. Dykstra	downbound	10:56		
	E.R. Breach	downbound	12:23		
4/19	Bai Como II	upbound	22:34		
	G.A. Stinson	upbound	23:02		
	C.M. White	downbound	02:07		
	Sharon	downbound	04:14		
	Tadoussaz	downbound	09:53	•	
	P.D. Block	downbound	15:22		
		downbound	20:35		
	J.N. McWaters		22:14		
	J.O. McKellar	downbound	22:14		

Table continued

			Date reported	vessel es observed (and Time timated (a)/ b) reaching
Date	Vessel Name	Direction	reaching Nine Mile Point	Date	y area Time
	· · · · · · · · · · · · · · · · · · ·	,			
4/19	E.L. Ryerson	upbound	23:45		•
4/20	Quedock	upbound	04:00		
	A.M. Anderson	upbound	05:00		
	A.H. Ferbert	upbound	14:18		
	Senniville	upbound	15:11		
	E.D. Barber	u pbound	16:01		
	R. Indiana	upbound	16:35		
	Federal St. Laurent	upbound	17:12		
	Texaco Warrior	upbound	19:20		
	Elton Hoyt	upbound	23:02		
	Quetico	upbound	23:03		
	Armco	downbound	00:45		
	G.L. Mauthe	downbound	. 01:50		
	'West Run	downbound	10:54		
	C. Victory	downbound	07:51		
	Hochelaga	downbound	14:21		
	L.R. Desmarais	downbound	15:25		
	Doan Transport	downbound	14:44		
	Canadock	downbound	16:29		
	E.B. Green	downbound	21:19		
4/21	P. Thayer	upbound	04:13		
	W.R. Roesch	upbound	06:29		
	M. Miner	upbound	09:41		
	Lake Shell	upbound	13:36		
	C. Callaway	upbound	13:48		
	E.R. Breach	upbound	14:25		
	Georgian Bay	upbound	20:44		
	E.L. Block	downbound	06:25	•	
	Elgo Soo	downbound	07:10		

Table continued

			Date reported reaching Nine	vessel es observed	and Time timated (a)/ (b) reachir dy area
Date	Vessel Name	Direction	Mile Point	Date	Time
4/21	Sir J. Dunn	downbound	07:57		
	Fort York	downbound	08:45		
	Elgo Indiana	downbound	10:50		
	Murray Bay	downbound	15:10		
	A.M. Glossbrennen	downbound	16:20		
	Simco	downbound	17:41		

Appendix 4. Incident light (in foot-candles) measured with a submarine photometer at the surface, middle, and bottom at Frechette Point and Six Mile Point, February 16-April 21, 1979.

Incident light (in foot-candles) measured with a submarine photometer at the surface, middle, and bottom at Frechette Point and Six Mile Point, February 16-April 21, 1979. The last column (%) is light measured at the bottom expressed as a percentage of light measured at mid depth in the water column. [Ice thickness not measured (a); broken floe ice only (b).]

		Station			Incident 1	ight (foot	-candles)	
Date	Station	depth (m)	Time (hours)	Ice thick- ness (cm)	Surface	Middle	Bottom	ı
<u> </u>	Deacton	(1:1)	(HOULS)	ness (cm)	Sur race	MIGGIE	BOCCOM	
2/16	7a	1	1310	46	5,000	2,800	440	15.7
			1330	46	1,200	370	80	21.6
	7c	1	1310	46	1,000	400	70	17.5
			1330	46	5,500	800	300	37.5
	7 a	1	1310	46	1,200	290	42	14.5
			1330	46	1,200	410	83	20.2
3/18	2	1	1500	38	370	140	65	46.4
	4	2	1500	30	320	52	35	67.3
	5	3	1500	24	350	110	52	47.3
•	7	1	1445	61	430	170	60	35.3
	9	2	1445	41	370	80	45	56.2
	10	3	1445	27	480	120	66	55.0
	12	1	1415	51	580	250	64	25.6
	14	2	1415	52	450	73	50	68.5
	15	3	1415	46	560	84	42	50.0
	17	1	1400	a [.]	740	180	60	33.3
	19	2	1400	a	760	110	50	45.4
	20	3	1400	a	930	130	49	37.7
4/21 ^b	2	1	1100	•	540	260	190	73.1
			1300		1,700	1,200	710	59.2
			1500		760	580	290	50.0
			1700		540	390	210	53.8
	4	2	1100		530	420	250	59.5
			1300		2,500	910	500	54.9
			1500		820	370	290	78.4
			1700		480	290	170	58.6
	5	3	1100		570	120	52	43.3
			1300		2,000	330	160	48.5
			1500		730	190	7 7	40.5
			1700		530	140	30	21.4
•	9	2	1330		1,300	550	420	76.4
			1530		1,900	870	640	73.6
			1730		330	210	120	57.1
	12	1	1600		1,100	170	25	14.7
			1800		210	39	8	20.5
	14	2	1600		1,200	320	130	40.6
	15	3	1600		940	360	150	41.7
			1800		190	72	21	29.1
	17	1	1630		950	190	43	22.6
			1830		140	4	3	75.0
	19	2	1630		840	420	270	64.3
			1830		140	54	47	87.0
	20	3	1630		1,400	390	250	64.1
			1830		220	52	36	69.2

Appendix 5. Fishing effort and catch at Frechette Point and Six Mile
Point in the St. Marys River, January 16-April 21, 1979. [Each
lift at a station represents one piece of gear fished overnight for
one night; two traps were fished at station 4 on March 17 and April 20.]

Fishing effort and catch at Frechette Point and Six Mile Point in the St. Marys River, January 16 - April 21, 1979. [Each lift at a station represents one piece of gear fished overnight for one night; two traps were fished at station 4 on March 17 and April 20.]

Date gear				Catch	
lifted	Station	Gear	Species	#	Total length (cm)
7an 16	1.4	Cillmat		•	
Jan. 16	14	Gillnet		0	-
	19	Gillnet	white sucker	1	34
Feb. 14	9	Fyke net		0	-
Feb. 16	14	Fyke net	white sucker	6	35,36,38,40,43,50
March 15	14	Fyke net	white sucker	2	43,44
March 16	9	Fyke net		0	-
	14	Fyke net	white sucker	1	44
•	19	Fyke net	white sucker	5	39,40,45,46,46
March 17	9	Fyke net		0	~
	14	Fyke net	white sucker	2	43,43
	19	Fyke net	burbot	1	67
	13	Tyke nec	white sucker	1	45
	4	Mas a sa			
	4	Trap	sculpin (Cottus sp.)	4	-
April 18	9	Fyke net	and Min	0	-
	14	Fyke net	white sucker	7	37,40,41,41,42,43, 44
			yellow perch	1	32
	19	Fyke net	lake herring	1	39
			northern pike	1	56
			white sucker	7	38,39,41,44,45,45 46
			longnose sucker	r 1	41
April 19	4	Fyke net	white sucker	18	36,38,39,39,39,41, 41,42,43,43,43, 43,44,45,46,46, 48,48
			yellow perch	1	31
	9	Fyke net	burbot	3	66,74,76
		_	white sucker	3	43,46,48
	14	Fyke net .	white sucker	1	42
	19	Fyke net	burbot	1 '	86
			lake herring	1	. 18
April 20	4	Fyke net	white sucker	2	41,44
		Trap	ninespine stickleback	1	-
			sculpin (Cottus sp.)	1	_

Appendix 6. Comments received on draft report circulated for review on August 6, 1979, by the Great Lakes Basin Commission.



DEPARTMENT OF ENVIRONMENTAL RESOURCES In reply refer to POST OFFICE BOX 1467 EARRISSUEG, PENNSYLVANIA 17130

RM-R F 110:7

August 16, 1979

David A. Gregorka, Administrative Director Great Lakes Basin Commission P. O. Box 999 3475 Plymouth Road Ann Arbor, Michigan 48106

Dear Mr. Gregorka:

This is in response to your August 6, 1979, request for comments on the two draft reports that are a part of the Environmental Evaluation Work Group FY 1979 Studies of the Winter Navigation Demonstration Program. The drafts are entitled as follows:

- 1. "Effects of Ship-Induced Waves in an Ice Environment on the St. Marys River Ecosystem"
- 2. "Environmental Monitoring Plan"

Regarding the first draft, we suggest that the following be added as Item 10 to the Executive Summary on pages 1-ii:

> "The report describes and summarizes field observations only. It neither endorses nor implies any conclusions from these observations. Before reliable and valid conclusions can be drawn, more detailed field work must be made to support any hypotheses that may be generated by the report.'

Regarding the second draft, the report needs a recommendation as to its application since funding of the monitoring plan is discouraged. We feel that the outlined plan would make an excellent reference in the EAGLE program.

Sincerely,

V. M. Beard. Director

Bureau of Resources Programming